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A Proposed New Method of Rating Radiators

Heating Effect at Mid-Points of Three Zones Bounded by Floor Line, Human Stomach Height, Head Height and Ceiling Advocated to Replace Total Heat Emission

By Dr. C. W. Brabbee

(From a paper presented at the annual meeting of the American Society of Heating and Ventilating Engineers, in Buffalo, N. Y., January 27-29, 1926).

FROM references to the extensive technical literature on heat transmission of radiators one would almost be justified in believing that there was sufficient international agreement in experimental results. But it has been the world-wide reputation of the United States of ever assuming new view points and making more practical application of science to industry. Mr. Frost in the *Journal* of the American Society of Heating and Ventilating Engineers has clearly indicated such an application.

"Summarizing this subject, one is impressed that the present method of testing radiation by which only the condensation is measured is very incomplete, and that a new method must be developed, a method that will cover all three modes of heat transfer—radiation, conduction and convection—if all the data necessary to properly study the subject of heat transfer from radiation is to be secured."

It is from this point that the new method must start. The assumed condition that a radiator is 100% efficient in the above sense is not self-evident, on the contrary it is erroneous.

A development similar to that which has taken place in the field of illumination, where definite standards of comparison have been accepted must take place in heating science. If for instance radiators for steam were built merely as condensers, the methods used up to the present time would be sufficient. This is not the case, radiators should not be considered as condensers but as means for heating when placed in rooms for human habitation, to maintain as perfect hygienic living conditions as possible.

ROOMS MUST BE HEATED THROUGHOUT LOWER STRATA

The first rule that we can apply from experience of the past is to keep the floor warm. This may be done by using a material that withdraws the least amount of heat from the feet. As we all know a smooth stone floor is most uncomfortable and conditions are greatly improved by the use of non-conducting floor construction or covering.

In general practice the heating system does not directly warm the floor and should therefore be directed to those parts of the human body, which are particularly susceptible to cold. This may be more clearly expressed by saying that the correct

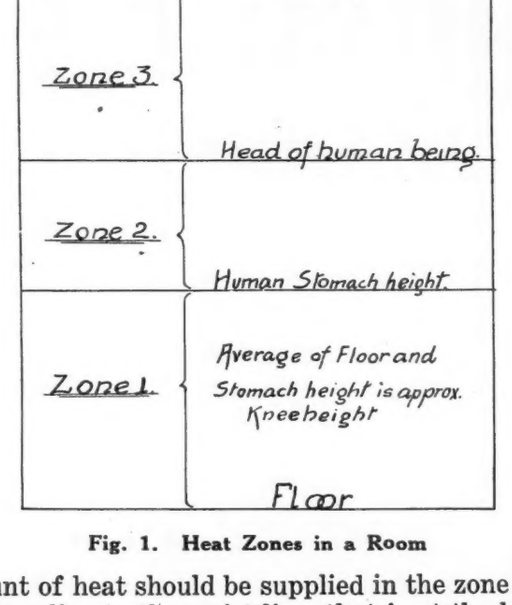


Fig. 1. Heat Zones in a Room

amount of heat should be supplied in the zone from the floor line to the waist line, that is at the height of the knee as a mean or average. If we divide a room as in Fig. 1, where Zone I extends up to the waist, Zone II up to the head, and Zone III to the ceiling, we can immediately say that most of the heat should be distributed satisfactorily and hygienically to Zone I; Zone II will require less heat; and excessive heat in Zone III is wasted.

It has been maintained that heat distributed to the ceiling, *i. e.*, in Zone III, is not lost, but helps to heat the floor above. There are several objections to this:

1. As a general rule the function of a radiator is to heat the room in which it is placed, not the one above it.

2. In many cases rooms that are not to be heated, or that are temporarily unheated, are located above the room in question.

3. In other cases the spaces above the room heated are exposed so that heat streaming up to them is entirely wasted.

4. Heat losses from the room depend on the difference between inside and outside temperatures. A higher ceiling temperature therefore increases this heat loss.

5. Natural ventilation is created in any heated room. Warm air is dissipated from the upper part of the room into the atmosphere and cold air enters through the infiltration at the windows and doors. Overheating in Zone III implies an increased heat loss by natural ventilation.

Therefore we say that in general the heat output of a radiator should be studied in relation to the room in which the radiator is set up, not to adjacent rooms; excessive heat on the ceiling is an additional heat loss.

HOW RADIATOR EFFICIENCY MAY BE DEFINED

Now we can clearly see that that radiator will be best in hygienic and scientific design, which transmits the greatest part of heat through Zone I. Therefore the efficiency of a radiator is not 100%, but the ratio of the heat output in Zone I (knee height) to the entire input (condensation) of said radiator. As we are not able to find this ratio for the time being, a relative or comparative method will allow us to take a step forward in the classification of radiators for practical use.

In the case cited for illumination, where difficulties due to many variations in the measurement of lighting effect were brought into order by the determination of a standard expressed in scientific terms, so in the heating trade a standard or standard form of measurement for heating effect will be a great aid in the problems of heat emission.

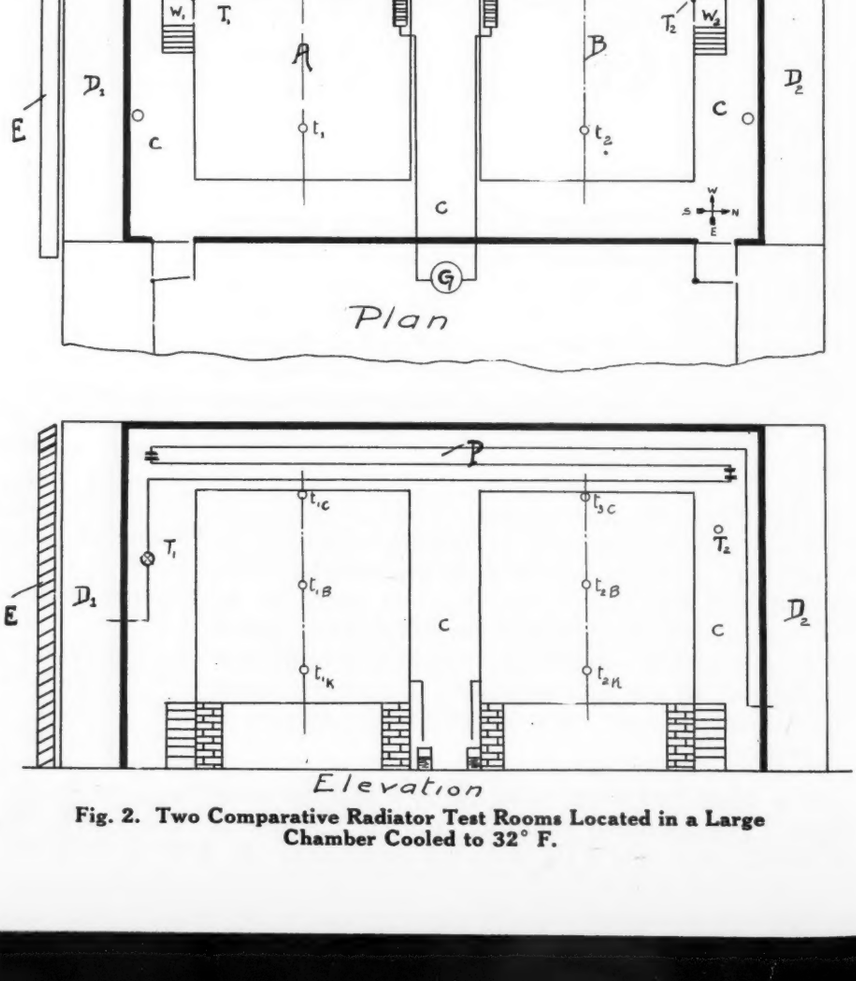


Fig. 2. Two Comparative Radiator Test Rooms Located in a Large Chamber Cooled to 32° F.

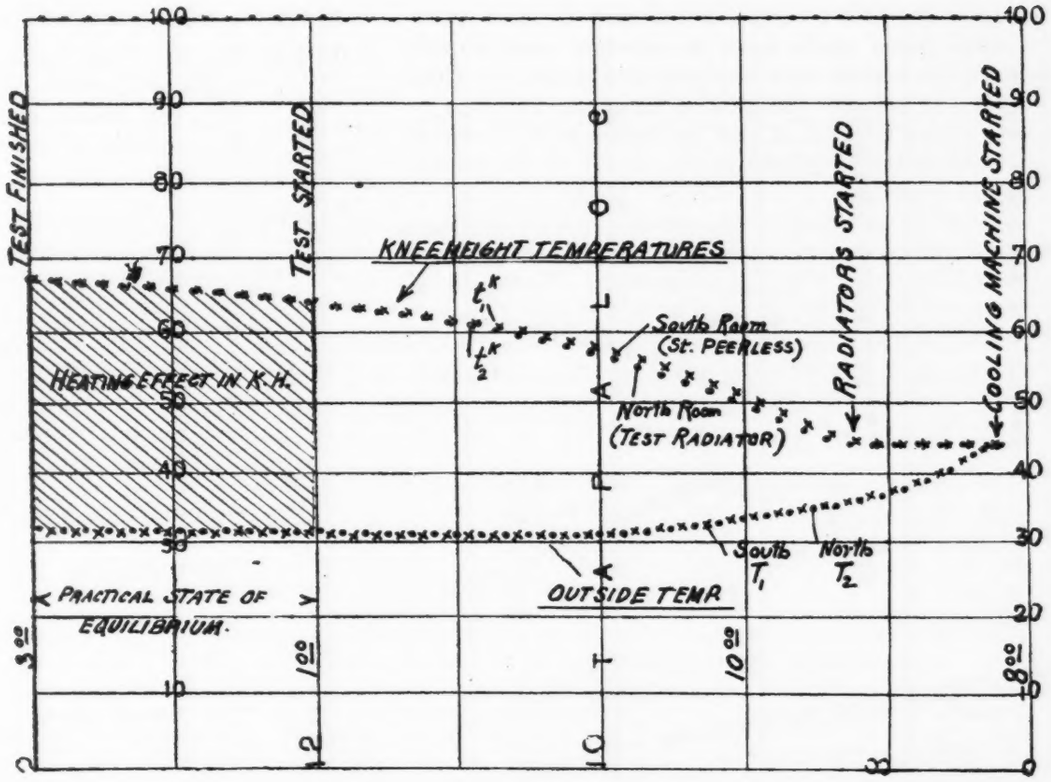


Fig. 3. Temperature Diagram Using Comparative Radiator Test Method.

Scientists, engineers, and the industry with the co-operation of the government or authorized societies should determine a standard radiator used under certain specified conditions. Such a standard radiator could be made up of entirely plain sections not designed for actual installation in practice but only for such comparative tests. Then the regular types or new designs of radiation should be tested and rated relative to this standard.

INITIATIVE TAKEN BY AMERICAN RADIATOR COMPANY

The American Radiator Company, working on these questions for two years, has already taken the first step in this direction. Before considering in greater detail the method of comparative testing and rating of radiators, the manner of carrying out these tests, and some of the results obtained, an example will show the important nature of the questions suggested and answered by this method.

On the one hand consider a Peerless flue radiator 38 in. high, with extended indirect rib heating surface, on the other hand a Peerless window radiator 20 in. high. Our tests give the following results:

Judging by condensation only, the Peerless window has an emission 11% less than the Peerless flue. But judging by heating effect at knee height the Peerless window is 17% more efficient than the flue radiator. We can therefore see how large an error, about 30%, can be made in judging radiators by condensation only.

We shall now describe the experimental installation and method used by the American Radiator Company in its laboratory at Yonkers, N. Y.

ARRANGEMENT OF TEST EQUIPMENT

Up to the present time the test installation has been completed only for steam radiators, but will later be extended to include water radiators.

Two rooms of equal size A and B (Fig. 2) were constructed according to general American practice. The rooms are identical, supported on brick piers and with free space on all sides. (Walls are of 2 × 4 in. studding, covered on exterior with sheathing, building paper, metal lath and three coats of cement stucco. Walls on the interior are spruce lath and plaster. Floors are double, the surface of the floor being of oak. Ceiling are plastered similarly to the sides. The roof is covered with 1 × 6 in. sheathing and asphalt paper roll roofing. Each room has a single door, 2 ft. 8 in. × 6 ft. 8 in., also two single windows on one side, each 2 ft. 6 in. × 4 ft. 10 in., all of standard construction.)

As the drawing shows, these rooms are situated in a large surrounding chamber C, which is completely insulated with cork and asbestos cement, and which stands free inside the laboratory proper, having air spaces D_1 and D_2 on all sides. This chamber C is cooled uniformly throughout by the coils P in the bunkers near the ceiling. The panel at E, painted aluminum bronze serves to keep out the sun's radiation. In fact these test rooms are so well protected that neither in summer nor winter are they affected by atmospheric disturbances. An even temperature is maintained inside C, by means of three electric fans, which give a slight air movement.

Fig. 3 shows the even temperature T_1 and T_2 maintained on both sides of chamber C automatically recorded by electric resistance thermometers. These are checked by a number of calibrated mercury thermometers.

Any slight inequality in the heat loss of the two rooms or in the steam supply to the radiators can be eliminated by an interchange of the radiators

between the two rooms. A number of such interchanges were made both in summer and winter and showed that such inequalities were less than ± 1%. Furthermore as the standard radiator is always kept in room *A* and the radiator to be tested in room *B*, the relations of the latter to the standard are constant.

Steam is supplied from an automatically controlled gas boiler sufficiently superheated to enter the radiators with 1° F. superheat. Water separators and traps are located in the supply lines at several points, also immediately before the radiators, to insure absolutely dry steam. Both the supply and condensation lines are well insulated. The inlet and outlet temperatures of the steam passing through the radiators are observed by calibrated thermometers inserted directly into the medium through special brass stuffing boxes.

Conforming to the demands of hygiene and the growing practice in this country the radiators are placed as near as possible to the source of the greatest heat loss, the windows, and still permit of using higher models of radiators.

The room temperatures are measured at points t_1 and t_2 in the center line of the room (Fig. 2), one quarter of the distance from the rear wall, at three heights, knee height—18 in. from the floor (t_1k and t_2k), at breathing height—5 ft. from the floor (t_1b and t_2b) and just below the ceiling (t_1c and t_2c). These locations in the rooms were adopted after experimentation as being the least disturbed directly by influences from the windows and doors. The temperatures at knee height t_1k and t_2k are also recorded with those of the outer room. The readings in the rooms are taken every half hour and serve as a check on the instrument records.

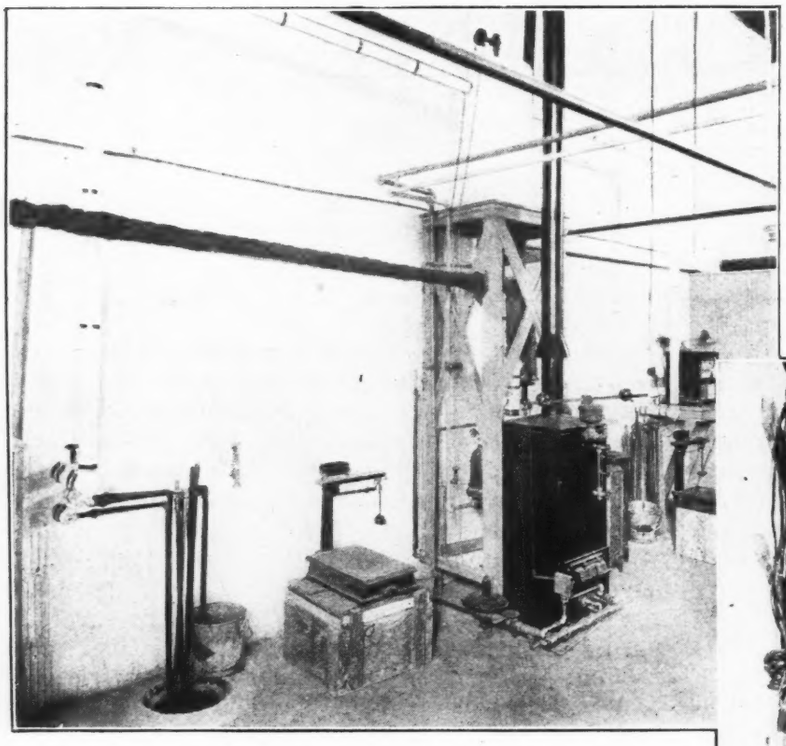
A test is run somewhat as follows:

8:00 A.M. Doors of test rooms have been open over night to permit of ventilation. The test rooms are now closed. The cooling system is started.

8:30 A.M. The steam boiler is started.

1:00 P.M. The test installation is so figured that by this time the temperatures in the cooling chamber will be about 32° F. and inside the rooms at knee height about 65° F.

A condition of practical equilibrium is attained in both rooms at this time, control readings are taken and a two-hour test period starts.



Views of Radiator Test Rooms.

Fig. 4 (Left) Gas Boiler (Automatically Controlled), Steam Tank, Steam Distribution Lines, Recording Instrument, Traps, Scales.

Fig. 5 (Below) Exterior View—Two Test Rooms—Radiator Supply Lines, Thermometers, Wiring of Thermo-elements.

The sample diagram (Fig. 3) shows the records of the test.

The heating surfaces of both radiators in the test rooms are taken so that in a condition of equilibrium the temperatures at knee height will be the same.

It has been maintained that the measurement

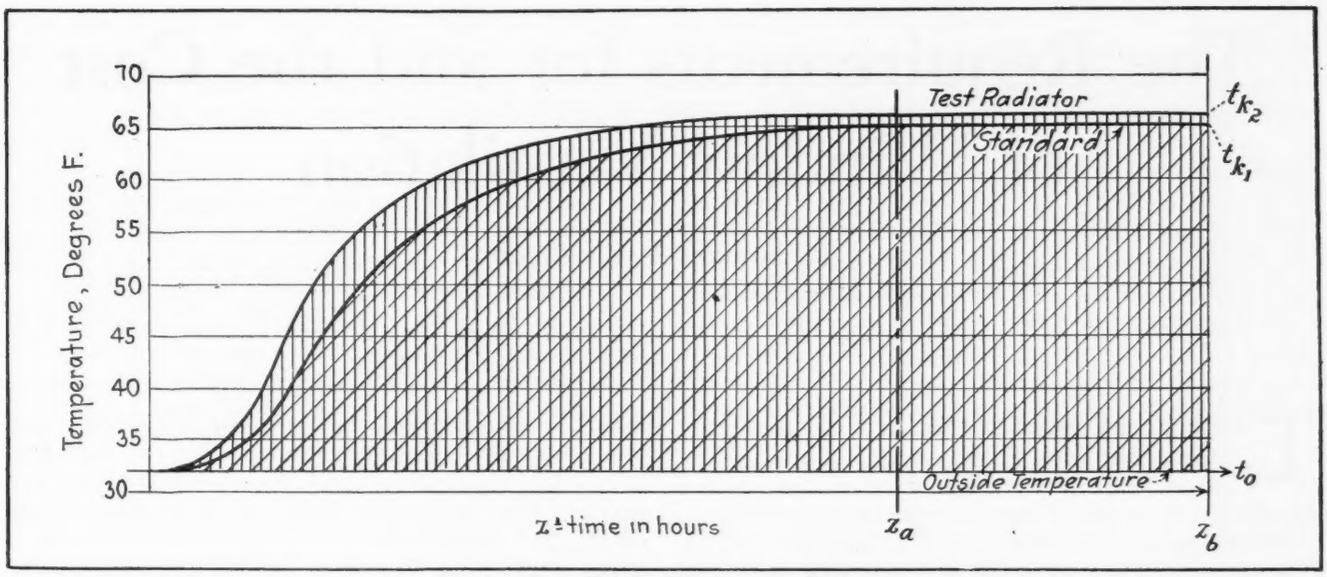


Fig. 6. Knee Height Temperature Diagram

of temperatures for rooms such as these can only be given correctly by thermometers protected against radiation, *i. e.*, with a bulb gilded. We do not agree with this opinion. The human body enjoys the benefits of heating in the form of radiation, conduction and convection, therefore instruments should be used that react to all three, which up to the present time are ordinary thermometers, either glass or resistance with a normal outer surface.

The comfort of human beings is not only dependent on the temperature of the air, but also upon the relative humidity. In order not to complicate further the records of the tests, they are started and finished with the same temperatures and relative humidities in both rooms (knee height). As a check the relative humidity was observed at various times and showed differences of not more than ± 1%.

One of the first and most important factors to be considered when calculating and estimating the results of the tests is, as mentioned earlier, that all such results must not be considered in an absolute sense, but relative to a standard.

As noted for the technique of illumination, a standard was fixed, and various lighting factors judged in relation to it. For such a standard in these comparative tests we have used the Peerless three-column 38 in. height, which is so generally used throughout the country and is satisfactory in its heat emission. Theoretically the latter does not matter, as this radiation is only used as the norm from which the deviations of other radiators are recorded.

In order to have tests standardized, uniform conditions should be maintained throughout, in this case an outside temperature of 32° F. (equivalent to zero weather for normal winter exposure) and 65° F. inside temperatures at knee height. The percentage of error for these tests is within the limits of ± 2%, which is sufficient for all practical purposes.

Since this new method of comparative tests gives us the heating effect of radiators under conditions closer to those obtaining in practice than heretofore, let us see how it can be applied.

One procedure would be for an independent laboratory under the direction of recognized authorities to test all radiators under standard conditions and in standard test rooms, in the manner which has just been outlined, and to publish the results in the form of tables.

The objection might be raised that relative values for radiators tested in these two rooms of equal heat loss would not hold for other rooms. This might be true for very exceptional cases, but for the great majority of practical installations the relative results obtained from a set of standard rooms can be taken as an excellent criterion for classifying radiators within the limits of ± 2% of this method.

For the time being this method of determining the heating value of radiators is not only desirable but essential for correct design and judgment. We do not require a certain number of square feet of iron surface in our rooms, but a definite amount of heat properly distributed at knee height. Anyone familiar with standard radiator designs can easily construct a radiator with a large heating surface, but a comparatively small effective heat output at knee height.

The only method for checking excessive statements has been the determination of condensation coefficients, which are not the right basis for measurement according to the facts already presented. It is more satisfactory to make the tests as described and thereby determine the rating or effective heat output of radiator at knee height.

When radiators are installed on the basis of their "Effective B.t.u.'s" as determined from this new method of test, their heating effect will be applied most economically for the engineer and builder and most hygienically and to the greatest satisfaction of the occupant.

It may be worth while to mention that the idea of Practical Tests under Standard Conditions can be applied to the problem of Boiler Rating, simplifying the whole matter a great deal.

The Requirements for and the Cost of Window Ventilation

By Samuel A. Challman

State Director of School Buildings for Minnesota

(From a paper read at the annual meeting of the National Council of School House Construction, at Harrisburg, Pa., November 19, 1925)

THE publicity given to that part of the report of the New York State Commission on Ventilation relating to window ventilation is responsible for a great many erroneous notions as to the requirements for and the relative cost of this method of ventilation. The name, window ventilation, is a misnomer, since this designation is generally used to apply to the mere opening of windows.

As a matter of fact, the commission's own report stipulates explicitly that there are a number of other considerations that enter in, and all of these must be met, if satisfactory results are to be obtained. The report also states that no detailed investigation has been made as to the cost of this system but that it seems reasonable that the cost of extra radiation and window boards would be more than balanced by the ducts and fans required in the plenum method.

As to the equipment and the operation of the window system of the New York State Commission, there are six requirements to be met:

1. Under the lower sash there is to be inserted a *deflector* providing for a horizontal entry of air and a vertical discharge, induced by a series of parallel curved plates (p. 335).
2. Beneath this deflector there must be a *radiator* extending the full width of the deflector for the purchase of heating the air discharged from this deflector (p. 521).
3. On the wall opposite the windows, *exhaust ducts* with a total cross-section area of 8 sq. ft. for a school room of standard size must be provided (p. 522).
4. Instead of the usual allowance of 192 cu. ft. of space for each pupil, this method calls for from 250 *to* 310 *cu. ft.* for each pupil according to age, the larger space being required for the older pupils (p. 522).
5. The temperature of the room is to be kept 67° *F.*
6. *An Eastern exposure* of windows is unsatisfactory, as it does not give the full advantage of prevailing winds (p. 384).

But even if all these conditions are met, the commission hesitates to give it unqualified approval as it specifically states (p. 528). "There will be many schools in which this method cannot be applied. Where noise, dirt, and odors from the street make it inconvenient to have the windows open, the use of the plenum system would, for instance, be clearly indicated; and where classrooms are markedly overcrowded *window ventilation* would prove *inadequate.*"

From the publicity given this report, one might be justified in thinking that the commission had established the superiority of window ventilation over any other method, and it is, therefore, strange to run across such a statement (p. 527) as "In final summary we may conclude that either window ventilation or plenum fan ventilation—if the plant be properly designed and operated—yields generally satisfactory results from the standpoint of the air conditions in the average school room."

In view of this, what more can really be desired than what the plenum system admittedly gives? This does not mean that all plenum systems have been properly designed or give satisfactory results. As a matter of fact, many an installation has been fearfully bungled by incompetent ventilating engineers and irresponsible contractors. But even where the work has been properly done, results may be unsatisfactory, because the system is not intelligently operated.

What we need is greater competency, both in design and operation of our ventilating plants. Only skillful engineers should be permitted to design ventilating plants, and immature students of engineering, whether in the employ of supply houses, giving free engineering service, or in business for themselves, should be barred from getting their education at the expense of the public. *Schools for training operating engineers, such as have been established in connection with the Minneapolis public schools, are a laudable undertaking in the interest of intelligent service and a proper return on the investment of public funds.* Plenum systems, lay opinion to the contrary, are not complicated, intricate, or made inoperative by opening windows. All they require is an understanding of how they may be successfully operated and what constitutes the service they are required to give.

COMPARATIVE COSTS OF WINDOW AND FAN VENTILATION

As regards the cost of the installation of the plenum and the window ventilation systems, the

following items are to be pitted against one another. With a window ventilation system no blower or heat-ducts are necessary, and when we have said this, we have eliminated all that can be eliminated.

On the other hand, the window-ventilated schools must have classrooms from 3% to 6% larger, as the cubic space allowance per pupil has been increased from 192 cu. ft. in plenum-ventilated rooms to 250 and 310 cu. ft. in window-ventilated rooms. This added space will increase the cost of the building and require more radiation than the smaller room. As a matter of fact, the outside wall space will have to be practically covered with radiation from the front to the back of the room.

Eliminating the direct radiation of the plenum system will mean larger mains and larger vertical pipes for carrying the increased amount of steam to the various rooms. The commission stipulates further that vent ducts are to be at least 120% larger than what is required with the plenum system. Then again, rooms with an eastern exposure (generally the most cheerful rooms in any schoolhouse) would be unsatisfactory for school purposes, which would result in increased cost of construction, owing to the problems which would have to be met in avoiding the location of school rooms on this side. With a plenum system no such problem would arise.

It must be quite evident that there can be no saving when the building must be enlarged, the radiation increased, and vent ducts more than doubled, and all the rooms on one side of the building tabooed for school use, particularly as we can dispense with no greater part of the mechanical equipment than the blower and the heat ducts.

In these days when economy is absolutely essential in order to give the growing generation the greatest possible opportunity for an education, it would be manifestly unfair to increase the cost of ventilation in our schools by such a system as that proposed by the New York State Commission, particularly as the system is no better than what we already have and cannot be installed advantageously under the varying conditions which made for economy of construction.

Development in Industrial Standardization During 1925

By C. E. Skinner
Chairman, American Engineering Standards Committee

THE closing year has shown important developments in the growth of the industrial standardization movement. One of the most important of these has been the increase of active interest on the part of industrial executives. A conference of first-line executives, held early in the year, organized a committee from their number to serve as an advisory committee to the American Engineering Standards Committee, and these men are now giving time and assistance to the solving of national standardization problems. Formerly, the matter of standardization has been left largely to the technical man, but it is now generally recognized that standardization is a managerial problem of the first rank.

Of special interest to the factory owner and manager is the Directory of Specifications, published in August, 1925, by the Department of Commerce. This compilation lists approximately 27,000 existing specifications covering 6,000 commodities, and it will be found very useful in connection with purchases. The astonishing multiplicity of specifications on the same subject has brought sharply forward the problem of unifying them into consistent groups.

The list of projects now before the A. E. S. C., at various stages of development, totals 218, including 76 approved standards. Notable progress has been made during 1925 in the completion or further development of many of these projects.

At a conference in December a comprehensive program for the standardization of drafting-room practice was launched. There has been great interest in this subject and it bids fair to become a matter of first importance on account of the wide range of industries which it affects. Although many individual factories have already worked on the standardization of drafting-room practice, we are on the whole far behind European countries in bringing about the economies which are possible through national standards.

In the electrical field, the 1925 edition of the National Electrical Code, the bible of the electrical wiring industry, has been approved. Also a system of connections and markings for electric power apparatus, representing the combined effort of a large number of engineers, has been approved as American Standard, after standing the test of several years practical application on a large scale. A standard for instrument transformers has been recommended for approval, and a standard for synchronous converters has also been submitted.

In the field of industrial safety, satisfactory progress has been made on a program of some 40 codes, most of which are applicable to factories. Seventeen of these have been completed, and work on half of the remainder is well advanced.

The fourth year of the work of Mr. Hoover's Division of Simplified Practice has shown even more rapid development than heretofore. In all, 39 simplifications have already been carried through, 10 others are in the final stages, and 65 additional surveys are now under way. Over two hundred industrial groups are co-operating in the various projects.

Approximately 350 specifications have been promulgated by the Federal Specifications Board, which means that these specifications have been unified as between the various branches of the Government. A leading part in this work is being taken by the Bureau of Standards, the Director of the Bureau being ex-officio chairman of the board.

This is the fifteenth lesson of
The Heating and Ventilating Magazine's

New Home Study Course in Gravity Steam and Water Heating*

Lesson No. 15—Radiators and Radiation (Concluded)

By Ara Marcus Daniels

RADIATORS are often located under seats or shelves or behind grilles of various designs, in order to conceal the radiator or to conserve space. This practice is becoming more and more common in the equipment of many classes of modern buildings. The procedure, however, generally reduces the heating efficiency of the radiator as compared with the same radiator when exposed. Consequently, for enclosed or concealed radiators, a suitable allowance must be made for this decrease in the transmission rate per square foot per hour, per degree difference in temperature. Increased radiating surface must invariably be used when the radiator is concealed.

The effect of enclosures, shelves, screens and recessing on the heat-transmission of radiators so installed was rather elaborately investigated several years ago by Professor K. Brabbee and the results of those investigations afford, perhaps, the most reliable factors that are available for determining the proper surface for radiators installed in such manner. The tests were originally reported in THE HEATING AND VENTILATING MAGAZINE for May, 1914, but data developed by them are included in this lesson since no course in heating and ventilation would be complete without such data.

Eight different methods of installation are illustrated in Figs. R-3-1 to R-3-8, inclusive. Each will be taken up separately and a problem assigned to exemplify the application of the factors derived.

Instruction available to subscribers only. The first lesson appeared in November, 1924, but students can enroll at any time. Immediately upon enrollment, Lesson 1 will be sent you, together with the Work Problems pertaining to that lesson. Full directions will be included as to where to send solutions of the Work Problems.

The complete course consists of 30 lessons. They are divided into sections. Lessons 6 to 11 were devoted to water heating. Lessons 12 to 15 covered radiators and radiation. Commencing with Lesson 16 the subjects considered include gravity steam heating, steam and water boilers and cost estimating.

Price of course complete, with copies of text and problem sheets in convenient loose-leaf form, arranged by colors for different parts, and fully indexed for cross reference, $100 payable in equal monthly installments of $10. This includes a critical analysis of the Work Problems as solved by each student. An enrollment blank will be sent you upon request, together with full directions for securing all the benefits of the instruction. Students who satisfactorily complete the course will be awarded a Graduation Certificate.

For ready comparison, the rate of heat transmission per square foot per hour per degree difference in temperature has been denoted by P for a radiator installed 2½ in. from the wall in still air without enclosure, such as a shelf, grill or screen, and tested under the same conditions as obtained during the experiment with the enclosure in place. Thus, when a grill or screen was used, as shown by Fig. R-3-1, and the transmission rate was determined to be 8% less than with the radiator in the open, this fact may be expressed as P——8%.

The spacing of 2½ in., noted as R and F in installation of Fig. R-3-1, was found to be the most efficient spacing for an enclosed radiator. By increasing or decreasing this spacing, the transmission efficiency was reduced, a greater decrease being noted with an increase in the 2½-in. space. The design of grilles, providing free areas are equal, was shown to have practically no appreciable effect on the rate of heat emission from the radiator.

If the heat loss from a room is 12,560 B.T.U. per hour and a 38-in. 2-col. steam radiator is to be used, installed as shown in Fig. R-3-1, the area required and that upon which to base the pipe size are determined as follows: Assuming the temperature of steam at 220° F., the transmission coefficient (from Table R-2-1) is 1.65; the temperature range is standard, so the total heat emission per square foot will be 150 × 1.65 = 248 B.T.U.; but since a radiator installed in the manner indicated suffers a reduction of 8%, the transmission rate

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will be 248 × 0.92 = 228 B.T.U.; thus, 12,560 ÷ 228 = 55.1 as the square foot of surface required; the pipe size to supply the radiator may be based on a radiator of 55.1 sq. ft., transmitting 228 B.T.U. per hour, or upon a radiator transmitting 248 B.T.U. per hour, which in this case would be 12,560 ÷ 248 = 50.7 sq. ft.

Work Problem R-3-1

The efficiency of transmission of a radiator may be increased by installing a screen in front of it with no covering above the radiator, as shown by Fig. R-3-2. It is important with an installation of this type that the air inlet I at the bottom should be amply large. The tests indicated that to extend the enclosure higher than 52 in. had little tendency toward increasing transmission. For example, with a 52-in. screen and 12-in. bottom opening, there was indicated a 12.5% increase, whereas with a 72-in. screen and same-size bottom opening, the increase was only ½% greater, or 13%.

Work Problem R-3-2

Shelves placed at various heights above the tops of radiators, not exceeding 1½ in., reduced transmission efficiency at least 2.5%, for narrow, and 5% for radiators 32 in. high and higher. For radiators up to 26 in. high the reduction in efficiency was more marked, amounting to 5% with shelves 3 in. above top of radiator and as much as 10% when the shelf was only 1½ in. above it. Deflectors, as shown in Fig. R-3-3, had practically no beneficial effect.

Work Problem R-3-3

Recessed radiators installed as shown in Fig. R-3-4 have a lower transmission efficiency, the extent of reduction being dependent upon the space at the back between the wall and the radiator and the distance of the under side of the recess above the top of the radiator. The distance from the sides of the radiator to the wall has practically no effect on transmission. The distance "a" in Fig. R-3-4 should never be less than 3 in. while distance R should always be made 2½ in. for maximum efficiency. Under such an installation the loss in transmission, as compared with an openly-installed radiator, would be 8%; for other distances, as given in Fig. R-3-4.

All of the data as to effect of recesses, grilles, etc. covered in this lesson apply to water as well as steam radiators.

Work Problem R-3-4

Radiators installed as in Fig. R-3-5 having enclosures with various sizes of outlet screens at the top of the enclosure suffer a reduction in radiation. With a screen at the top of the enclosure having the length and width of the radiator, with a 2-in. open slot the same length as the radiator, the reduction will be about 15%. Slight improvement is obtained with screens wider than the radiator. Screens narrower, however, cause further reduction at the rate of about 5% in addition to the 15% for every inch the screen is narrower than the radiator.

Work Problem R-3-5

Open-inlet slots of various sizes cause less reduction when used with high radiators, 32-in. and above, than with low radiators. In each case, reduction in transmission occurs as noted in Fig. R-3-5.

Work Problem R-3-6

Screened inlets in place of open slots, for equal areas, exert about the same effect on radiation transmission for high as well as for low radiators. They reduce the transmission in amounts as indicated in Fig. R-3-5.

Work Problem R-3-7

Fig. R-3-6 shows an enclosed radiator with open slots at top and bottom of enclosure and with a space of 2½ in. above the radiator. Again, a reduction in efficiency occurred amounting to about 25% for high radiators and 33% for low 3-col. and 40% for low 2-col. radiators. The slots should always be as long as the radiator and 2 to 3 in. high.

Work Problem R-3-8

Perforated sheet-steel fronts, with top of exposure 2½ in. above the radiator, reduces heat transmission for 2-col. and 3-col., both high and low radiators, by about 20%. See exact percentages given in Fig. R-3-7.

Work Problem R-3-9

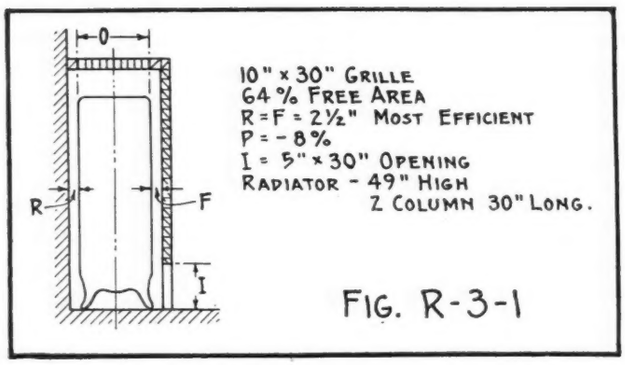
Window recesses or seats, with an air supply taken through the top of enclosure, reduces radiation of heat by 30%, for high, and about 40% for low radiators. See Fig. R-3-8. The space D can seldom be made greater than 3 to 4 in. wide.

Work Problem R-3-10

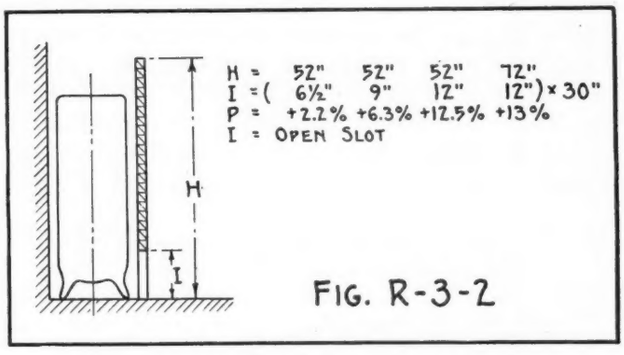
SELECTION, LOCATION AND INSTALLATION OF RADIATORS

The selection, location and installation of radiators involves a consideration of many factors in which the experience and judgment of the engineer plays no small part and in which the wishes of the owner, particularly if the installation be in a residence, should have due consideration insofar as whims or desires may not be allowed to conflict with good design.

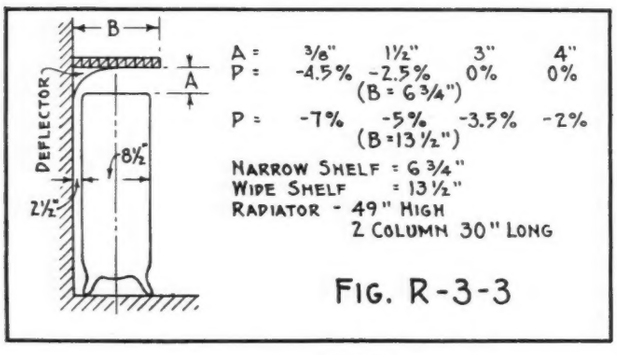
The type of system, whether it be steam, water or vapor, immediately fixes the kind of radiators that will be used. The adaptability of steam and water radiators was covered in a preceding lesson of this part.



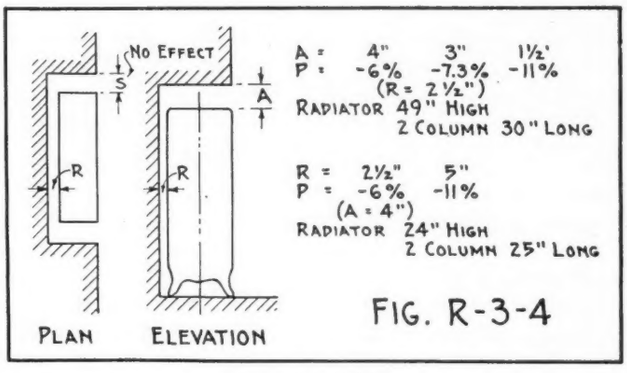
Arrangement with Grille in Front, Closed Top



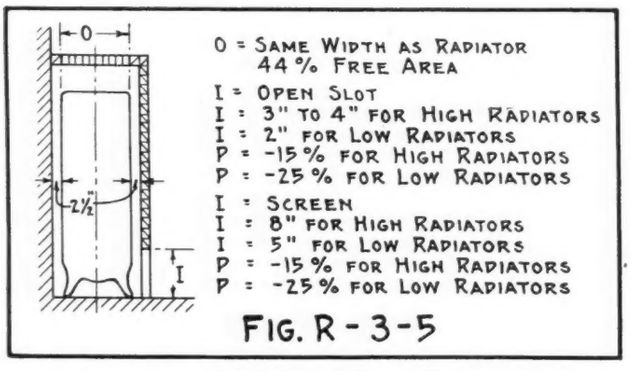
Arrangement with Grille in Front, No Top



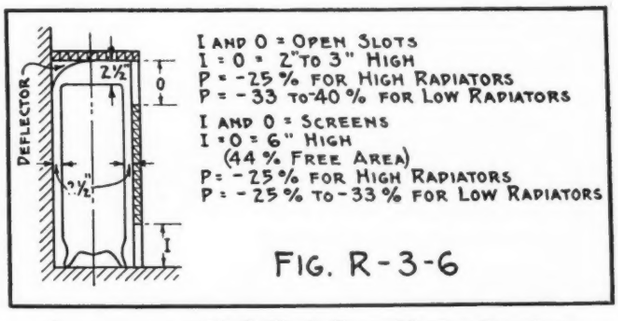
Arrangement with Shelf Above



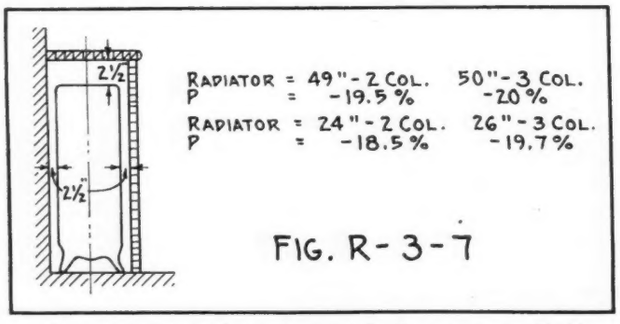
Recessed Radiator


O
2½"
I
O = SAME WIDTH AS RADIATOR
44% FREE AREA
I = OPEN SLOT
I = 3" TO 4" FOR HIGH RADIATORS
I = 2" FOR LOW RADIATORS
P = -15% FOR HIGH RADIATORS
P = -25% FOR LOW RADIATORS
I = SCREEN
I = 8" FOR HIGH RADIATORS
I = 5" FOR LOW RADIATORS
P = -15% FOR HIGH RADIATORS
P = -25% FOR LOW RADIATORS
FIG. R-3-5

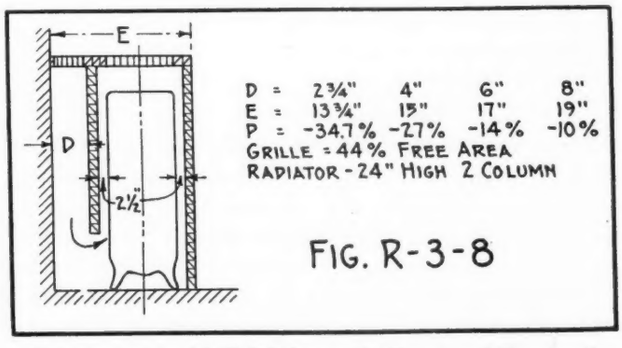
Arrangement with Grille in Front, Variable Sized Outlet at Top


DEFLECTOR
2½"
O
2½"
I
I AND O = OPEN SLOTS
I = O = 2" TO 3" HIGH
P = -25% FOR HIGH RADIATORS
P = -33 TO 40% FOR LOW RADIATORS
I AND O = SCREENS
I = O = 6" HIGH
(44% FREE AREA)
P = -25% FOR HIGH RADIATORS
P = -25% TO -33% FOR LOW RADIATORS
FIG. R-3-6

Arrangement with Grille in Front Having Openings at Top and Bottom; Shelf Above Radiator



Arrangement with Perforated Grille in Front; Shelf Above Radiator



Arrangement with Solid Screen in Front and Rear and Openings in Top Cover for Air Inlet and Outlet

Types of Enclosures for Direct Radiation, Used in Work Problems

The character of the structure and its use will influence, to a considerable extent, the decision as to the type of radiator to use. Cost, availability and facility of installation are also important considerations. Radiators with feet are generally easiest to install. They are obtainable as a unit and require only placement in the selected position. The 38-in., 3-col. radiator has grown in many localities to be considered more or less standard. Consequently, it is generally carried in stock and often is lower in cost per square foot of heating surface than other sizes or kinds of column radiators.

Column radiators are commonly used for most of the rooms in residences. In the living room column radiators are generally placed directly in front of the windows and are of a height slightly less than the height of the sill above the floor. When the window sills are low or seats are built in front of the window, a window radiator will be found necessary. The effort should be to locate the radiator so that air which leaks in will have its temperature raised before it reaches the frequented part of the room.

Low-column, or window, radiators are often used in dining rooms and kitchens and should be located as explained above. The small amount of available wall space in kitchens often makes it necessary to locate the radiator in this room under the drain board or sink.

Halls and bedrooms are usually supplied with column radiators. In the hall, narrow high radiators are generally employed. They should be located so that incoming air will be heated before passing into the main part of the hall and thence to the rooms connecting therewith. In the bedrooms, wall space is frequently at a premium, which relegates the radiator to the window position which is really the proper place for it.

Sun parlors and breakfast rooms generally require the use of low or wall radiators placed to care for infiltration in the sun parlor and to be the least in the way in the breakfast room.

Bath rooms require, usually, tall radiators of few sections of the narrow-column type, or a wall radiator which can be placed under the lavatory or in other space that would not otherwise be utilized.

For apartment houses, the same applications hold as for residences.

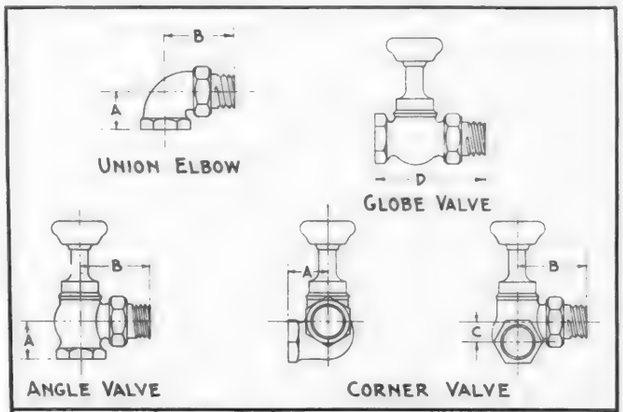
For office rooms in large office buildings, suitable column radiators are generally employed, while in the corridors on first floors, column radiators are placed just within the door or, if the building has a vestibule, the radiator is placed there so as to raise the temperature of the outside air previous to its entrance into the building proper. On other floors, spaces in front of windows, in juts between columns, or equal distribution along the wall in long corridors is the usual custom.

A large window radiator placed on the floor in front of the show window, with column or wall radiators along the rear wall, are commonly used for small stores. Large stores demand a tempering of incoming air at the doors, as with large office buildings, and therefore require installation of radiators in similar places. In the store room proper column radiators are frequently placed around columns or in the center of wide aisles, with suitable shelves above the radiator on which goods may be displayed.

For hospitals and sanitariums, column radiators with greater distances between sections and column radiators without legs, which may be attached to the wall, are generally specified as they are more accessible for cleaning.

Factories afford many opportunities for the ingenious use of wall radiators while the use of wall radiators, in turn, provide a solution for many problems arising in factory heating where direct radiation is to be used. When wall space is available, units of wall radiators may be conveniently assembled on the floor and lifted into position directly below windows or at other points along the wall. With limited wall space, wall radiators may be installed in double rows. Suitable brackets are available for either single or double-row mounting.

TABLE 8-3-1—ROUGHING-IN MEASUREMENTS FOR RADIATOR VALVES AND UNION ELBOWS



	Pattern	Meas.	Size - Ins.					
			½	¾	1	1¼	1½	2
Steam Valves	Angle	A	1 1/4	1 3/8	1 5/8	1 7/8	2 3/32	2 1/2
		B	2 13/32	2 3/4	3 3/32	3 7/16	3 7/8	4 21/32
	Corner	A	1 1/4	1 1/2	1 3/4	1 31/32	2 11/32	2 5/8
		B	2 13/32	2 7/8	3 1/4	3 1/2	4	4 25/32
		C	9/16	3/4	13/16	15/16	1 5/16	1 17/32
	Globe	D	3 3/4	4 3/16	4 11/16	5 3/8	6 1/16	7
Water Valve	Angle	A	1	1 3/16	1 13/32	1 5/8	1 27/32	2 19/64
		B	2 7/16	2 3/4	3 1/16	3 7/16	3 15/16	4 9/16
Union Elbow		A	1 1/4	1 1/4	1 1/2	1 31/32	2	2 9/32
		B	2 13/32	2 5/8	3 3/16	3 3/8	3 3/4	4 17/32

Where floor and wall space in factories is demanded for benches, machinery, platforms, etc., wall radiators may be hung from girders, in roof bays, light wells or other more or less unused space by means of supports provided for such installation.

Special applications of wall radiators are many of which the following are a few: as partitions, by standing several sections in suitable leg brackets placed in an open space and attaching (by special bracket) a shelf above; to partition large floor areas for present and future needs; to form the under-floor of drying rooms; as the base support

for tanks holding liquids that must be kept at a workable temperature; under benches in greenhouses, etc.

In residences, apartments, and large offices, it is advisable, where manually controlled, to divide the heating surface into two radiators, making the surface of one radiator equal to twice that of the other so that one, two or three-thirds of the total surface may be employed, depending on outside temperature changes.

ROUGHING IN REQUIREMENTS

During the construction of new buildings and before walls, floors and ceilings are closed, the heating contractor must install certain of his piping. This requires that the stubs left projecting through the floor must be the proper distance from the wall and the center-to-center distance, such as to accommodate the radiator specified for the particular location.

The designing engineer, therefore, should include on his layout such needed dimensions. In establishing the proper distances, it is necessary to take into account the length of the radiator over the bosses of the tappings of the end sections and spaces allowed for bushings, elbows and valves.

LENGTH OF COLUMN RADIATORS

Table R-1-1 contains data on column radiators; measurement "G" indicating the width of each section for the various kinds of column radiators included in the table. Thus a 10-section, 3-col. radiator would have an overall length of 10 x 2½ (inches per section) = 25 in.

Work Problem R-3-11

BUSHINGS AND REQUIRED SPACE ALLOWANCE

End sections of column radiators are usually tapped 1½ or 2 in. at the top and 2 in. at the bottom. Therefore, it is necessary to use bushings when pipe smaller in diameter than the tapping is to be connected thereto. The bushings, when screwed into the end sections of the radiators, project, requiring that allowance be made and a distance added to the radiator overall length. It is customary to allow ½ in. for each bushing.

If the radiator is to be connected for one-pipe steam or for water circulation, with supply and return connected on the same side, ½ in. should be added to the overall length of the radiator to allow for the bushing. If the radiator is to be connected for two-pipe steam or for water circulation with supply and return connected on opposite ends, it would be necessary to increase the overall length 1 in. to care for bushing projection.

Work Problem R-3-12

VALVES AND REQUIRED SPACE ALLOWANCE

Steam radiators are usually connected to the piping system by one or two valves and water radiators are connected by a valve and a union elbow. All radiator valves are equipped with a union connection.

Table R-3-1 contains roughing-in measurements, as presented by one manufacturer, for radiator valves and elbows. Similar measurements by other manufacturers will most likely differ slightly. It is important, therefor, in practice, to select the make of valves that will be used before determining and establishing the overall roughing-in measurements.

The male end of the valve connects with the radiator, while the female end connects with the piping. There is likely to be differences in the distance that radiator valves will set in the bushings when tight. For roughing-in work it becomes necessary to assume this measurement. Values often used by fitters are ½ in. for connections ranging from ½ in. to 1¼ in. in diameter and ⅝ in. for 1½ and 2-in. connections.

Work Problem R-3-13

When estimating the space required for a radiator with connections, due allowance must be made for installing the valve, remembering that there must be sufficient clearance to permit turning the valve through a full circle when screwing it into the stub. Thus, an angle valve having a "B" measurement of 3-7/16 in. (Table R-3-1) required at least twice this distance for installing unless the union is removed from the valve. This may be done, in which case the space required will be considerably less.

WIDTH OF COLUMN RADIATORS

A column radiator should not be set closer than 2½ in. from the wall for best service so that a free circulation of air will be permitted behind it. This minimum distance should be kept in mind when selecting the type of radiator to be used for a given location, specially where floor space is limited. The fitter should be informed for in nearly all new buildings the piping must be installed quite a time before the radiators are set, requiring that the distance from the finished wall to the center line of the radiator tapping be definitely established.

Widths of various column radiators are noted as measurement "E" in Table R-1-1. The distance across the feet (measurement F) is usually a little greater than "E" but this additional width can usually be disregarded. The various needed distances may be obtained as follows:

To find the projecting distance of a given radiator from the wall: 10½ in. (4-col.) + 2½ in. (distance from wall to back of radiator) = 13 in.

Work Problem R-3-14

To find the distance from the finished wall to the center line of tapping or to the center of the stubs: 10½ in. (4-col.) ÷ 2 (one-half width of radiator) + 2½ in. (distance from wall to back of radiator) = 7¾ in.

Work Problem R-3-15

Column radiators, when hung on the wall by means of concealed brackets and wall radiators, usually set 1¼ in. to 1¾ in. from the wall. This distance will vary depending upon the type of radiator and bracket used. Manufacturers' catalogs contain measurements suited to the respective bracket used.

Work Problem R-3-16

HANDLING AND INSTALLATION

Care should be exercised in the handling and installation of all radiators. When delivered at buildings under construction, they should be protected against the possibility of dirt, sand, shavings or other foreign matter getting in through the tapped openings, to cause circulation troubles after the radiator is set and connected.

Broken or strained nipples with resulting leaks are liable to show up where long assembled units are ordered, handled and installed. A radiator unit weighing in excess of 1,000 lbs. should never be ordered Several smaller units, with combined areas equal to that required connected on the job, are cheaper to handle and afford greater all round satisfaction when used.

Work Problem R-3-17

This lesson concludes the part devoted to radiators and radiation. Lesson No. **16**, *to appear next month, will be the first of eight lessons in the section devoted to low-pressure gravity steam heating systems and will include a discussion of the properties of steam, effect of pressure on temperature, latent heat of vaporization, heat of the liquid, total heat, saturated steam, dry and wet superheated steam, vapor, heat required to form steam, the steam table and its use.*

Drafting-Room Practice to be Standardized

THE American Engineering Standards Committee announces the launching of a comprehensive program of standardization of drafting room practice. This action follows the unanimous recommendations of a representative conference held in December, which was attended by fifty individuals, representing a total of forty-eight professional and trade associations, large engineering schools, and manufacturing concerns, particularly interested in drawings for shop and construction work.

Doing away with the diversity in drafting-room practice and in the materials, equipment and tools used for making drawings, it is realized, will result in a more ready understanding of drawings by anybody for whom they are intended, in great savings in the draftsman's time and efforts, and in a more efficient use of drafting materials and filing cabinets for the storage of completed drawings. One of the important items, for example, is the series of sizes for drawings. If these can be standardized, it will not only be possible to utilize drawing paper and tracing cloth as it comes in rolls or sheets, to the greatest advantage; but it will also be possible to supply the drafting department with sheets cut to size in advance, and on which the border line and the several spaces for title, the part list, etc., have been printed.

Besides the question of drawing sizes, the program adopted by the conference contains mainly the following items: classification of and corresponding nomenclature for drawings in accordance with their purpose; method of representation of the subject, as, for example, the arrangement of views and sections; indication of dimensions and tolerances; indication of surface or finish; symbols representing in a diagrammatical form certain elements of construction, as threaded parts, gears, etc.; the arrangement of drawings as to borderline, title, notes; indication of changes and revisions, method of folding, etc.; the kind and size of lettering, figures and symbols; scales of reduction or enlargement; sizes of filing cabinets; drafting equipment and tools (triangles, scales, etc.); specifications for materials to be used for drawings (paper, tracing cloth, inks, pencils, etc.).

The work will be carried out by a large sectional committee on which all interested groups will be represented, under the sponsorship of the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education.

Movement to Unify American and British Screw Threads

THE American Engineering Standards Committee and the National Screw Thread Commission have invited the British Engineering Standards Association to a conference to consider the possibility of unifying the American and British screw-thread systems.

Both the American and the British systems of screw threads have been the result of a long national development, the basis for the American system having been laid by William Sellers in 1864, and that for the British system by Joseph Whitworth in 1841. The standard threads are called "American (national) standard thread" in this country, and "British Standard Whitworth (BSW) thread" in Great Britain.

A fundamental difference between the two national systems exists, however, with regard to the angle of thread. This angle is 60 degrees for the American, and 55 degrees for the British thread. Another difference, of less importance, consists in the American thread having flattened crests and roots, whereas those of the British Whitworth thread are rounded.

It is understood that no final decision in the matter will be taken until after the problem has been considered in a general international conference to which all of the twenty existing national standardizing bodies will be invited.

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IN view of what has happened during the past year or two, the progress in the matter of boiler ratings has been remarkable. We refer particularly to the revised methods of rating boilers adopted by several individual manufacturers. One manufacturer, for instance, announced new ratings based upon the heating surfaces contained in his boilers. Another came out with a list of three ratings for each boiler, designating them as "danger red," "practical black" and "true blue" boiler ratings. The first-named are those obtained by using the A. S. H. &. V. E. standard formula; the second are the regular catalogue ratings, and the third, or "true blue" ratings are described as those giving the most heat with the least fuel; they are considerably lower than the "practical black" or the "danger red" ratings. Still another boiler maker has issued revised ratings basing them upon the chimney surface provided, thus making the determining factor one's confidence in the manufacturer's appraisal of his boiler performances under different draft conditions. These developments were characterized by one writer as "laudable steps in progress because it reduces the scientific reason for such a wide variation of boiler performances down to terms of common vernacular."

Now comes the plan of another prominent boiler manufacturer to the effect that hereafter its boilers will be guaranteed for the revised capacities listed. To show what an advanced position this company has taken it need only be stated that the former catalogue ratings are published in parallel columns with the new "guaranteed" ratings. The guaranteed figures, on the average, run from 40% to 50% below the old catalogue ratings. It only remains for this manufacturer and others to eliminate their former catalogue ratings *in toto* to merit the undying thanks and approval of the entire heating industry.

THROUGH a special arrangement with the Heating and Piping Contractors National Association, we announce the publication in THE HEATING AND VENTILATING MAGAZINE of the Standard Radiation Estimating Tables developed by the association's Standardization Committee and adopted by the association as standard. The tables will appear in our columns in the form of data sheets, the first four sheets of the series (in this issue) being devoted to the basis on which the tables were constructed and the formula used.

As is well known, the Standard Radiation Estimating Tables have been found especially useful to heating contractors for the reason that more and more are they being called upon to guarantee to all purchasers of radiation that the radiation figured is the correct amount to be provided in a given building. With the tables accepted as standard, it is now possible to check any given installation and see whether or not sufficient radiation has been provided.

Perhaps the most noteworthy feature of the tables and the thing which most clearly distinguishes them from other methods is the fact that the prevailing wind directions and wind velocities in different sections of the country are taken into account, instead of allowing for one prevailing direction of wind and a 15-mile wind velocity, as is the case with most radiation formulas. A criticism of this method has been made on the ground that since the effect of wind movement is actually reflected only in the heat transmission coefficients of wall, roof or glass, and in the inleakage of cold air at the cracks around outside windows and doors, its effect should be applied to the transmission and infiltration coefficients, and not to the outside temperature. On this point there are arguments pro and con. Each method gives almost identical results. The distinction between them at the present time is that the H. & P. C. N. A. method, developed with great care to cover almost all of the leading cities of the country, has been adopted as standard by the Heating and Piping Contractors' National Association and is actually in successful use.

As has been pointed out on many occasions, it is plain that if two standard codes are established for figuring radiation they can never have the authority and standing that would be accorded a single code. For this reason it seems to us of the highest importance that the interests most directly affected should come to an understanding regarding the adoption of these tables, or of some similar single standard method of estimating radiation.

American Society of Heating and Ventilating Engineers

Heating Engineers Come to Grips with Window Ventilation

Views of Open-Window Advocates and Inherent Fallacies of Natural Ventilation Occupy Center of Stage at Society's Annual Meeting

GRAVITY window ventilation for school rooms advocated by the American Public Health, the National Education and the American Medical Associations, representing the bulk of the medical men and health officials of the country, as well as a great number of school authorities, easily took the leading place in the program at the thirty-second annual meeting of the American Society of Heating and Ventilating Engineers, held in Buffalo, N. Y., January 27-29, with headquarters at the Hotel Statler.

William H. Driscoll,

President, American Society of Heating and Ventilating Engineers

The presence of Dr. C.-E. A. Winslow, President of the American Public Health Association, perhaps the leading advocate of window ventilation, and the presentation of his views on the subject, as well as the far-reaching consequences of the movement, keyed up the meeting to a high pitch of interest. In a dramatic session which began with Doctor Winslow's address on "Objects and Methods of Ventilation," the fallacies inherent in the open-window method were forcefully presented by such men as Perry West, and Champaign L. Riley, of New York; Professor Acheson, of Syracuse University, and Dean F. Paul Anderson, of the University of Kentucky. The discussion was epitomized in three resolutions adopted by the meeting which are presented on another page of this issue.

In addition to the symposium, the meeting was notable for the many importance topics on the program. These included a proposed new method of rating radiators, offered by Dr. Charles W. Brabbee the distinguished Austrian engineer; the experiments conducted at the A. S. H. & V. E. Research Laboratory and at the works of the Kewanee Boiler Company on the operating characteristics of steam and water-type radiators; and the presentation of a new humidity chart by Claude A. Bulkeley.

In the agitation for changes in the society's constitution and by-laws, many of the differences of views were harmoniously adjusted, and the remaining points of issue referred back to the members for mail ballot.

The attendance at the meeting was unusually large, the registration totaling 413.

Opening Session, January 26

In the absence of President Dibble, who was attending his son's graduation exercises, the meeting was opened by Vice-President William H. Driscoll. A large sign directly behind the dais bearing the letters in gold of "A S H V E" added greatly to the settings of the Fillmore Room where the sessions were held.

The welcome of the Western New York Chapter was expressed by the chapter's new president, William G. Fraser. Mr. Fraser was followed by Roswell Farnham, of the chapter's Committee on Arrangements. Following an invocation by a Buffalo clergyman, the welcome of Buffalo was expressed by Philip J. Coon, second vice-president of the Buffalo Chamber of Commerce. Mr. Coon made the interesting statement that within the limits of Buffalo were to be found representatives of 62% of what have been termed the "standard" industries.

R. D. Flershem, vice-president of the American Radiator Company, spoke for the manufacturers of Buffalo. He mentioned the interesting fact that Buffalo has no less than 10,000 men engaged in the heating and ventilating industry and that the capital represented in this industry alone in Buffalo is $50,000,000.

Greetings were read from W. Nelson Haden, of England, whose visit to this country two years ago

and whose presence at the society's Washington meeting were recalled.

The council's report brought out the interesting statement that a committee of three, headed by F. R. Still, has been appointed to arrange for the publication, as a code, of the society's "Compendium of Heating and Ventilating Engineering," which was adopted last summer at the Atlantic City meeting.

The secretary's report showed a total enrollment of 1900 members. A campaign, it was stated, will shortly be inaugurated to run up the membership to 2500.

For the Finance Committee, Thornton Lewis reported the society's finances to be in a most flourishing condition, with no less than $46,000 in the general fund. This, he said, shows an increase of $36,000 in the last three years, or an average increase each year of $12,000. The largest increase took place during 1925, amounting to over $15,000. There is now available for the Research Laboratory about $7,000, representing The Guide profits for 1924 and 1925, after deducting the amount set aside for meetings expenses.

The Publications department for 1925 showed a profit of $9,000, an increase of $3,000 over 1924. For the first time, said Mr. Lewis, the society is now able to get along, with something to spare from dues only. Much of the credit for the society's improved condition was given to A. V. Hutchinson, manager of publications, and to Former Secretary F. C. Houghten, now the society's Director of Research. For the first time in a number of years, the society is up-to-date in the publication of its Transactions.

The only unfavorable feature, said Mr. Lewis, in the society's finances, is the amount of unpaid dues, which comes to $11,000. Of the cash on hand, amounting to $16,000, approximately $15,000 is invested as a reserve fund. When these invesments reach $25,000, it was the committee's suggestion that the entire income of the society be spent upon its work. This could either take the form of enlarging the activities of the society itself or the surplus could be turned over to the Research Laboratory. In connection with the report, Homer Addams offered a motion, which was carried, providing for the appointment of a committee of five to make a survey of the causes for the non-payment of dues by so many members.

The Publication Committee's report, presented by Mr. Hutchinson, referred particularly to the arrangements made for the publication in the *Journal*, in a series of installments, of the government report on the ventilation of vehicular tunnels.

For the Membership Committee, C. V. Haynes gave figures showing that while the increase in the society's membership had not been impressive, no notable dropping off of membership had occurred as a result of the increase in dues, which went into effect a year ago.

For the Special Committee on Printing Code of Minimum Requirements for Heating and Ventilation of Buildings, Mr. Still told how it was proposed to change the name of this publication from "Compendium" to "Code" and to separate it into two sections, one section to contain the code proper and the other to be made up of text matter to be published in the society's Guide. When this is done the code section will be presented to the society for adoption as a model to be used in legislation. The committee's plans were taken as a direct answer to the challenge of those who are decrying the status of present laws on heating and ventilation.

Resolutions on Open Window Ventilation

Resolved, that the A. S. H. & V. E. appreciates the fact that the American Public Health Association earnestly desires to indorse that condition of ventilation which is calculated to give greater health and comfort to the occupants of places of assembly. The A. S. H. & V. E. has been working diligently for many years through the Research Laboratory in connection with the Bureau of Mines and the United States Public Health Service to determine scientifically the required conditions to produce the greatest comfort.

Therefore the A. S. H. & V. E. solicits the co-operation of the American Public Health Association in making this determination.

Resolved, that it is the sense of this meeting that it would be a grave mistake to advocate the repeal of present laws which require installations in accordance with present standards until something better than present practices can be agreed upon; that present ventilating standards are the result of many years' practical experience; that present laws based on those standards have been a positive influence for good; that the wholesale letting down of the bars to permit anything so indefinite as "window ventilation" would be a step backward, and would result in a chaotic condition detrimental to public health and best interest.

Resolved, that the A. S. H. & V. E. welcomes definite air supply information from the American Public Health Association, but most definitely disagrees with the suggestion that any consistent ventilation can be obtained via air admission through windows with gravity vent flues.

NEW OFFICERS

The report of the tellers, presented by Chairman J. A. Donnelly, showed the election of the ticket as nominated. The new officers are:

President, William H. Driscoll, Long Island City, N. Y.; first vice-president, Dean F. Paul Anderson, of the University of Kentucky; second vice-president, Professor A. C. Willard, of the University of Illinois; treasurer, Walter A. Gillham, Kansas City, Mo.; members of council: Willis H. Carrier, Newark, N. J.; J. A. Cutler, Chicago; Professor S. E. Dibble, Pittsburgh, Pa.; C. V. Haynes, New York; W. T. Jones, Newtonville, Mass.; E. B. Langenberg, St. Louis, Mo.; Thornton Lewis, Philadelphia; and J. F. McIntire, Detroit, Mich. As members of the Committee on Research, the follow-

ing were elected: Willis H. Carrier, Newark, N. J.; Professor S. E. Dibble, Pittsburgh, Pa.; C. F. Eveleth, Camden, N. J.; H. P. Gant, Philadelphia, Pa.; and E. B. Langenberg, St. Louis, Mo.

Afternoon Session, January 26

In a prologue to the presentation of his paper, "The Heating Effect of Radiators," Dr. Charles W. Brabbee referred to his education having been in German and French, as providing an alibi for his faulty English. In an extemporaneous outline of the paper, however, Doctor Brabbee erased every reason for such an excuse, and demonstrated a ready command of English with its characteristic technical phrases.

The angle of attack on the ploblem and the logic applied was typically that of the scientist, yet the development of the idea, and its application, were along such lines that the results may become immediately available to the industry in a very practical way. It would appear that Doctor Brabbee has not only "started something," but has almost finished it, inasmuch as the volume of tests that has been made is so great as to leave little doubt as to the general accuracy of the results. It was stated that over 150 radiators were tested as outlined in the paper.

(The principal portions of Doctor Brabbee's paper are presented on another page of this issue.)

Initiating the discussion, Willis H. Carrier said that he agreed with Doctor Brabbee in his statement that the Katathermometer did not provide an adequate measure of human comfort, and that it was therefore of little value in determining the effect of radiation.

S. R. Lewis, in agreeing that human comfort involved the proper distribution of heat in lateral planes, said that in some cases at least 15% of the heat expended might be saved by its proper utilization; that is, by maintaining less difference in temperatures at the breathing-line and the ceiling.

R. V. Frost outlined "A Proposed Code for Rating and Testing Radiators."

Proposed Code for Rating and Testing Radiators

Mr. Frost's proposal was for the heat-emission method of rating radiators, instead of the surface method now used. The recent development of new radiator types, he said, has given these questions new force, as such radiators are penalized by the present method of rating. Mr. Frost referred to the Allen radiator tables developed at the A. S. H. & V. E. Research Laboratory (published in The Guide for 1925-1926 and in THE HEATING AND VENTILATING MAGAZINE Data Sheets Nos. 13MM to 13TT).

Manufacturers, said Mr. Frost, offer the objection that 60% of the radiators are installed by men who pay no attention to the engineering phases of their work. This is answered by the suggestion that for the present, at least, the rated surface and the heat emission be printed in parallel columns, as is done in the Allen tables.

Other factors entering into the proposed change are the listing of radiators by weight per section and new price lists based upon the section as the unit. The efficiency of the radiator is another factor.

Mr. Frost submitted a proposed code providing for capacity ratings of radiators on the basis of heat emission in B.T.U. for each size from 1 to 32 sections, the heat emission to be determined by the heat output of the radiators, instead of the heat input.

Following the reading of his paper, Mr. Frost added a contribution to the discussion of the previous paper by saying that his ideas and tests supported the data presented by Doctor Brabbee, and that, in a particular test made in his home during the present winter, he had studied the operation of two radiators at either end of a 28-ft. living room. One radiator was 38 in. high, with 60 sq. ft. of surface, and the other 22 in. high with 38 sq. ft. rating. The smaller radiator was recessed. Mr. Frost stated that in zero weather both radiators maintained a comfortable temperature, and that at 32° F. outside, the enclosed radiator, although of much smaller capacity could carry the load alone, while the high, open type would not heat the room. Further tests with several sets of thermometers showed that the smaller radiator produced a very uniform distribution of heat in the different strata, while, with the high open type, as much at 14° difference existed between floor and ceiling. While agreeing with Doctor Brabbee, he suggested the advisability of using, as a standard unit, the B.T.U. emission per section.

Professor A. C. Willard read, at the request of the secretary, a communication from Konrad Meier, who, from his Swiss home, sent his greetings to the society, and added his plea for the proper utilization of the heat emitted from radiators. "Heat emitted," he wrote, "and heat utilized are often assumed to be the same, while, as a matter of fact, heating efficiency is measured by the degree of utilization." Mr. Meier cited a case of church heating, with heaters under the seats, where the radiation was but 50% of what would have been required with wall radiation.

In discussing the paper by Mr. Frost, and his impromptu remarks, Doctor Brabbee said that he was gratified at the general concurrence on the general ideas he had presented, and, replying to the argument that test rooms, such as had been erected for the tests could not be readily duplicated, he stated that, based on similar tests he had made in Berlin, he felt safe in saying that results correct within plus or minus 2% could be expected, except in extreme cases.

Willis H. Carrier stated that he agreed with Doctor Brabbee, with the understanding that, at the outset, the tests should be carefully planned, and the test room designed as a standard.

A motion by Frederick D. Mensing was carried, to publish the discussion of the papers by Doctor Brabbee and Mr. Frost in the *Journal* for March.

It was further moved, and carried, that the entire question of radiator design be referred to the technical advisory committee, and that the committee make such recommendations as it desires at the earliest annual or semi-annual meeting.

The paper presented by E. H. Whittemore on "Forced Hot Water System Heats Ford's Twin Cities Plant" covered in a descriptive way an interesting problem involving a tremendous volume of one-story structure, situated on a high bluff in one of the coldest cities in the United States.

Arrangement of Pipe Coils in Trusses and Wall Radiators in the Ford Twin-Cities Plant

Forced Hot Water System Heats Ford's Twin Cities Plant

Mr. Whittemore's paper gave a general description, with illustrations from photographs, of the heating system in a manufacturing and assembling building 1400 ft. long by 600 ft. wide, with a computed interior cubical contents of 31,704,300 cu. ft. and with 327,740 sq. ft. of side wall and roof, glass and doors. The structure is practically one large room. Cast-iron and pipe coils constitute the heating surface, except that one section in the office building uses unit heaters.

The heat loss from the building, figured from — 20° to 60° F., is 23,338,000 B. T. U. per hour. The heating surface installed totals 480,000 sq. ft. of direct radiation, of which 440,000 sq. ft. is in 1½-in. pipe coils and 40,000 sq. ft. in column and wall-type cast-iron radiation. A large part of the radiation is placed overhead in the roof trusses. Steam lines are carried in the roof gutter to melt the snow and ice, with control valves at frequent points.

Steam for heating the water is supplied from a power plant 300 ft. away. The pump and heater room is approximately in the center of the building. Two 5000-gal. per minute low-pressure heaters warm the water for the heating system in the main portion of the building. There is also one 5000-gal. per minute high-pressure heater which is used as a booster. They are all of the horizontal type, with tubes of seamless drawn copper. Two turbine-driven and one motor-driven circulating pumps of 5000 gal. per minute each handle the main heating system. All pumps are of the horizontal double-suction, single-stage centrifugal type. Horizontal non-condensing single-stage turbines, designed to operate at 125 lbs. per square inch gauge, with 25 lbs. back pressure, are used. The motors are of the constant-speed type operating at 440 volts, 3-phase, 60-cycle A. C.

As applied to this particular layout the methods of solution followed in general this outline:

The necessary flow in gallons per minute through various parts of the system was computed as follows on the basis of a 30° temperature drop of the water:

Assuming a heat transfer factor of 2 B. T. U. per square foot per hour per degree difference in temperature, with water entering the coils at 200° F., and leaving at 170°, or a mean water temperature of 185° F., the total heat transmission through pipe coil surface would be 250 B. T. U. per square foot per hour.

With a surrounding air temperature of 60° F., it is found that $2 \times 125° = 250$ B.T.U. per square foot per hour.

For wall radiation a heat transfer factor of 1.9 B. T. U. per square foot per hour per degree difference in temperature was used and for column radiation an average transmission factor of 1.75 B.T.U. per square foot per hour per degree difference in temperature was used.

As the latter type of radiation was used in the office only where a room temperature of 70° was maintained, the temperature difference of 115° gives a heat transfer of 200 B. T U. per square foot per hour.

On the basis of a 30° temperature drop through the piping system it is determined that 1 gal. of water per minute will deliver 15,000 B.T.U. per hour. Therefore, each gallon circulated per minute is sufficient to supply 60 sq. ft. of pipe coil radiation or 63 sq. ft. of wall radiation, or 75 sq. ft. of column radiation, under the conditions in which the various types were used.

Commercial pipe sizes were selected on the basis of velocities of 5 to 8 ft. per second and the resulting friction through the system was then computed. By the use of tables available for this purpose pipe sizes were then adjusted until the entire system was balanced as nearly as practicable.

The total friction head against which the pumps would operate was found to be approximately 100 ft. It is interesting to note that in checking this figure by two different methods, one of which took considerably longer time than a more simple system first used, produced a result which was within 4% of the first computations, and required only one or two minor changes in the pipe sizes.

The piping system throughout the manufacturing building consists of what is commonly known as a reverse flow system with balanced mains. An attempt has been made to design the entire piping system to eliminate as far as possible the use of resistance control valves.

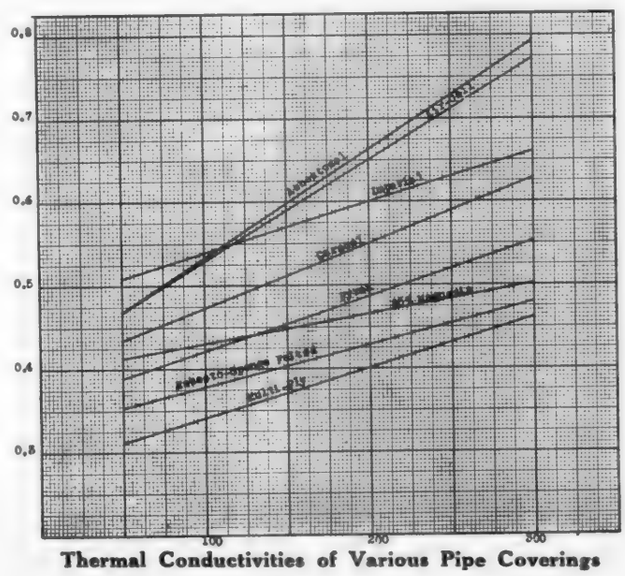
In reply to questions as to how well the heating plant had come up to expectations, Mr. Whittemore said that it had been completed too recently to make more than general statements, to the effect that the building had been heated to the required temperature, and that data were being collected that would later be available to bring out this point.

"The Advantages of Heat Insulation in Hotels, Apartment Houses and Private Residences" was presented by R. N. Heilman, who developed a series of curves from which the economics of pipe covering might be deduced.

Advantages of Heat Insulation in Hotels, Apartment Houses and Private Residences

Mr. Heilman, who has been a prolific writer on the insulation of steam and hot water pipes and other hot surfaces, presented detailed data for the use of the heating engineer in selecting, as well as in the use of, suitable heat insulation for such surfaces. Figures were included showing the savings possible with various types of insulation, including air-cell, Carocel, 85% magnesia and multi-ply covering. A table of pipe-covering factors included these materials and also asbestos-sponge felted, imperial, Pyrex and Asbestocel coverings.

Other points discussed were the economic thicknesses of insulation and annual operating expenses.



Thermal Conductivities of Various Pipe Coverings

A useful table was included on "Losses from Horizontal Bare Iron Steam Pipes."

In a prepared discussion L. B. McMillan disputed the accuracy of the data presented, going into a critical resume of the data from which the curves were derived and voicing his opinion that the curves did not take into account all the conditions.

Morning Session, January 28

President Dibble opened the Thursday morning session with his address which had been postponed from the opening session. President Dibble stated that the society's Research Laboratory is now in better shape than it has ever been in its history and he paid a high tribute to Mr. Driscoll for his work as chairman of the Committee on Research. The possibilities of the Research Laboratory, he said, are great. Interests other than those in the heating and ventilating field are beginning to look with expectancy toward the laboratory.

"I believe that I am as energetic in wanting immediate results," he declared, "as any other member of this society. However, I realize that research work requires time and thought and well-trained minds, given a specific work to do, will, after thorough study and some experimental work, develop valuable information." Very often in research it happens that months of time are spent on a problem with practically no evident results. So with our Research Laboratory, if we do not get immediate results, it is no indication that the laboratory is not functioning properly."

President Dibble referred to the relinquishment by F. C. Houghten of the office of secretary to become Director of Research, and of the appointment of F. C. Hutchinson as acting secretary, adding that "it looks now as though the secretarial work and the managing of the publications of the society could be handled by one man, with the addition of clerical help."

President Dibble urged that the standing committees of the society be changed with each incoming administration. He also suggested the appointment of a committee to take up the problems of the day, such as press reports and reports of various organizations through their technical committees which deal with heating and ventilation. "There is much going on in the country," he said, "regarding heating and ventilation which is erroneous, and the minds of the public are being shaped into wrong ideas as a result of these utterances. The committee of which I have in mind would seek publicity through the press and technical papers, along the line of fundamentals, written in a popular way, which have to do with heating and ventilation."

CONTACT WITH OTHER ORGANIZATIONS URGED

"The past year," he continued, "has proved to me that the time has arrived when this society should make direct contact with all other societies which have to do with heating and ventilating. We al-

ready have a committee co-operating with the American Institute of Architects, but I firmly believe that we should have a committee working with the Heating and Piping Contractors' National Association, another with the medical fraternity, another with the American Public Health Association, another with the National Warm-Air Heating and Ventilating Association and another with Mr. Hoover's Committee on Heating and Ventilating Standards. In other words, I believe that we have kept too much to ourselves heretofore, not with the idea that we know all that there was to be known about heating and ventilating, but with the thought that we were developing the heating and ventilating industry by keeping within our own circle and in close touch with one another. But the time has come when we must broaden out and work with other organizations which are closely allied to us.

"As an engineering organization, supporting a laboratory which produces fundamental information, we are the center for all heating and ventilaing information. We have long waited for the physician to tell us the ideal atmospheric conditions under which the human body would operate most efficiently, but to the present time he has not told us what this is, and we have been forced to set a standard of our own, hoping that some day the medical fraternity would give us the needed information. I think the time is here for us to make direct contact with the medical fraternity and ask them for specific information concerning air conditioning, and then seek to inform our members.

"The American Public Health Association has done considerable work along the line of ventilating, but from what I can gather from their report, they have been working in the dark, whereas, had they co-operated with a committee from our society, their work would have been much lighter, and the findings more accurate."

President Dibble spoke of the small loss of members due to last year's increase in dues and of the society's present prosperous condition. In discussing strictly society matters, he brought up the traveling expenses incurred in connection with council and committee meetings and he felt that the society must in time assume the greater part of or the entire expenses of the council and the committee members who attend these meetings.

Following President Dibble's address, moving pictures were shown of the New York and New Jersey Vehicular Tunnel, now under construction, featuring especially the elaborate arrangements for ventilating this tunnel.

The remainder of the morning session was given over to reports connected with the society's Research Laboratory. Chairman Driscoll of the Committee on Research took the chair and called upon Samual R. Lewis, chairman of the Advisory Committee on Subjects for a report.

SUBJECTS FOR RESEARCH LABORATORY TESTS

Mr. Lewis presented a list of the matters now under investigation at the laboratory, as well as those being considered for future investigation. These included:

Physiological reactions of human beings under various atmospheric conditions (now under way).

Investigation of safe limits of recirculation, especially by mechanical ventilation (new).

Critical velocity of liquids and gases (now under way).

Critical velocities in steam heating risers (new).

Influence of air valve orifices in single-pipe heating systems (new).

Determination of relative efficiency of water-type direct radiators and steam-type direct radiators when used for steam or vapor heating.

Investigation of proposed radiator rating code (new).

Infiltration of air through building construction (now under way).

Effect of air in filtration through chimneys, especially when located in outside walls, or through the flue linings (new).

Heat losses through building materials (stopped in 1924, but to be pushed through to completion immediately).

Additional subjects suggested for future consideration were the influence of the sun on buildings, various questions in connection with chimneys, such as construction, influence of adjacent obstructions, size relative to combustion rates, types of tops or caps and effect when different types of heaters are connected to the same stack.

Under boilers the suggested investigations cover combustion chamber area, internal water circulation, especially as to influence of free circulation below the water-line of steam boilers; causes of priming, appliances to measure and detect priming and effects of core sand or chemical residuals on priming and steaming. It is also proposed to check the application of the A.S.H. & V.E. boiler testing code.

Finally it is proposed to investigate further the value of ozone as a destroyer of bacteria and as a vitalizer of air, ventilation by cold-air introduction and direct-indirect ventilation effects on comfort.

For the Technical Advisory Committee on Infiltration, Chairman A. C. Willard told of some ambitious plans which were being made to secure data regarding the actual widths of cracks in existing buildings. The local chapters will be called upon, he said, to assist in this work. The need of additional tests on the air infiltration through building walls was also emphasized, due to the questionable figures brought out by the laboratory in its former tests of air leakage around windows.

Edwin S. Hallett suggested co-operation with the architects on this subject. Walter L. Fleisher told of the government's work in the direction of standardizing windows. Metal window frames also came in for discussion, especially as the windows in the Hotel Statler were of metal and showed noticeable leakage with the high winds prevailing during the period of the meeting. Mr. Whitten told of the use of expansion joints in this connection, consisting of a non-drying calking compound, set between the metal frame and the building.

Willis H. Carrier reported for the Technical Advisory Committee on Heat, Humidity and Air-Motion. The next step in this investigation, he said, will be the measurement of the sensible latent heat given off by human bodies at different effective temperatures, starting at 64° effective temperature and at 2° above and below this point.

For the Technical Advisory Committee on Radiation, R. V. Frost told of the tests which had been made at the Research Laboratory in connection with the proposed elimination of the steam-type of direct radiator. While his committee, he said, has no authority to recommend the elimination of steam-type radiators, he was prepared to say that direct steam radiators have no points of superiority over the water-types and that an air-valve tapping one-third from the top of the radiator is satisfactory for steam heating.

Mr. Frost showed a number of charts giving results of comparative tests on both types of radiators, indicating the effectiveness of water-type radiators.

C. E. Bronson, of the Kewanee Boiler Company, supplemented Mr. Frost's conclusions with his report of extensive tests, made recently at Kewanee, on steam and water-type radiators in which, in each case, the location of the air valve was varied from the top to the bottom of the radiator. The most satisfactory results were secured with the tapping half-way up on the water-type radiator. The next best results were secured with the tapping at a lower point. With steam-type radiators a higher position of the air valve gave better air elimination.

James A. Donnelly, who has been appointed chairman of the Technical Advisory on Critical Velocities in Pipes, in place of Professor F. E. Giesecke, resigned, told of the work being planned using high risers. Owing to the lack of head room at the Research Laboratory, this work will be carried out at the Carnegie Institute of Technology. Critical velocities with gravity water circulation will also be studied.

Chairman Driscoll of the Committee on Research told of the Research Laboratory's enviable financial position, with cash available for immediate use of $18,000. The advisory committees' membership, he pointed out, is made up of representatives from every chapter.

He referred to the plans under way for the establishment of an A. S. H. & V. E. Research Residence which, however, are not yet in definite form, and of the co-operative work planned with various colleges and universities supplementing the work of the Research Laboratory. In connection with the testing of commercial devices, which was authorized by the society, this, he said, will have to await the development of testing codes for the various devices tested, similar to that already compiled for testing fans. The laboratory's present arrangement with the government will prevent such tests from being conducted at the laboratory itself.

Director of Research Houghten spoke briefly on the work on which the laboratory is now engaged, illustrating his talk with views of the new set-up for testing air infiltration through building materials, and charts showing the latest data obtained on effective temperatures with men at work, normally clothed.

Afternoon Session, January 28

Two papers left over from the morning session were presented after the luncheon recess; one by A. C. Fieldner on "Scope of Bureau of Mines Tunnel Ventilation Investigation," featuring particularly the Bruceton tunnel tests, and the other by Dr. R. R. Sayers, who summarized the results of the different government tunnel investigations.

DR. WINSLOW CHAMPIONS WINDOW VENTILATION.

At this point, with an audience that filled every available chair in the hall, President Dibble presented as the next speaker, the guest of the society, Dr. C.-E. A. Winslow, Professor of Public Health of the Yale School of Medicine, and chairman of the New York State Commission on Ventilation, whose advocacy of open-window ventilation for schools has so stirred the industry.

Professor Winslow both prefaced and concluded his address with an appeal for co-operation between the society and the American Public Health Association in the development of school heating and ventilation in accord with mutually accepted facts of science and engineering.

Professor Winslow developed his thesis as an argument for the benefits, both physical and economic, of window ventilation, as expressed in the resolution recently adopted by the American Public Health Association, of which he is president (this resolution was published in THE HEATING AND VENTILATING MAGAZINE for December, 1925).

The main point of the contention was that the introduction, by mechanical means, of the prescribed 30 cu. ft. per minute at the comparatively high temperatures necessary to offset the chilling effect of drafts, does not permit as comfortable conditions as are afforded by the admission, by the gravity-method, of a much smaller quantity of air at lower temperature.

Most of the conclusions of this paper were based upon the findings of the New York State Commission on Ventilation. Dr. Winslow quoted in full the resolutions of the American Public Health Association, and added his emphatic endorsement.

The close attention paid to Dr. Winslow's address indicated the intense interest in the subject, and as he concluded he was warmly applauded.

In view of the widespread broadcasting of the action of the American Public Health Association, and of Dr. Winslow's avowed leadership in the movement, there was no dearth of prepared discussions in rebuttal by prominent members of the society. Among those who took the floor were Dr. W. J. McConnell, of the United States Public Health Service; Perry West,; Dr. E. Vernon Hill; Champaign L. Riley; Dr. R. R. Sayers, of the Bureau of Mines; Edward S. Hallett, Chief engineer of the St. Louis Board of Education; Dr. Charles W. Brabbee; Claude W. Bulkeley; Professor A. C.

Acheson, of Syracuse University; Col. Francis E. Fronczak, health commissioner of Buffalo, and Dean F. Paul Anderson.

The discussion carried the session long beyond the usual closing hour, and while the utmost courtesy prevailed, the speakers expressed themselves in no uncertain terms as totally at variance with the position taken by the advocates of window ventilation.

Perry West, in a carefully-prepared written discussion, brought out as one of his principal points, the fact that the saving in both installation and operating costs as claimed, in general terms, by Dr. Winslow, were more than offset by the increased construction costs.

Doctor Hill stated that he did not believe the conclusions reached by Doctor Winslow were justified by the data from which they were deduced, and stressed the fact that the keynote of mechanical ventilation is control.

Mr. Hallett agreed with Dr. Winslow to the extent of believing that the laws should not specify 30 cu. ft. per person, as the exact amount is not necessary if the person is comfortable. Mr. Hallett refuted the idea that drafts were the inevitable results of mechanical ventilation, and stated that the present status of the art was such that practically any desired quantity of air could be handled without objectionable air movement.

Mr. Bulkeley emphasized the lack of control ability of window ventilation with winds varying on opposite sides of a building at the same instant, and varying widely from day to day.

Professor Acheson expressed his disagreement with the conclusions reached from the New York tests on the grounds that these tests were started and stopped under such conditions that complete cycles were not recorded, the conditions at the conclusions of the tests being widely different from those at the starts.

Col. Fronczak, for twenty years health commissioner of Buffalo, came to the support of Doctor Winslow, with the direct statement that he was an advocate of window ventilation, and that his experience had shown him no satisfactory fool-proof system of mechanical ventilation. He issued a direct challenge to the society in the statement that ventilating engineers were on the wrong track and that until they had developed a satisfactory system they would have to keep on trying. He further said that, in Buffalo, the mechanical ventilating systems in the schools were operated in every way but the one for which they were designed.

Dean Anderson, reserved for the final thrust, won the immediate attention of his audience by the facetious remark that "this meeting is getting rough." He then launched into a whirlwind attack on the premises underlying Doctor Winslow's arguments, on the grounds that window ventilation was a revesion to primitive practice, and in no wise in harmony with the steady development of heating and ventilating knowledge and practice. He likened the use of window ventilation to the primitive methods of heating with "cannon" stoves, and the advances in controlled ventilation to the development of central heating plants furnishing uniform controlled heat to the home. So far from being "dead on their feet," as one speaker had expressed it, Dean Anderson said that if you think that we're dying hard, you have never been more mistaken in your life.

This conclusion brought the assembly to its feet with prolonged applause.

In his counter rebuttal, Doctor Winslow reiterated his thesis for window ventilation. "No exact data," he said, "but only opinions, have been presented this afternoon. So far from being only propaganda, this movement represents a well defined campaign by a force of tremendous potentiality, and you will find in nearly every large city tests are now being made to demonstrate the correctness of this theory."

"Let us try to get together," Doctor Winslow concluded, "and, on the basis of facts, develop what is best for our people."

Morning Session, January 29

The morning session opened with the presentation of a paper on "The Neutral Zone in Ventilation," by Professor J. E. Emswiler, of the University of Michigan.

The Neutral Zone in Ventilation

Professor Emswiler explained at the outset that the neutral zone has been used to designate the level within a room at which the pressure is just equal to that outside. His paper went on to explain the relation between the position of the neutral zone and the motive heads arising from temperature differences available for causing flow, and to show in a general way how the idea of the neutral zone is helpful to a better understanding of the problems of ventilation, more especially in a large factory building with natural ventilation. The data given in the paper were largely the results of an investigation of natural ventilation undertaken by the Engineering Research Department of the University of Michigan in co-operation with the Detroit Steel Products Company, extending over about three years.

The main points brought out in the paper were that:

1. The head tending to cause flow at any opening, is proportional to the vertical distance of that opening from the neutral zone.

2. The amount of air that may be passed by a given opening is proportional to the square root of the vertical distance of that opening from the Neutra Zone. Therefore, an opening located at the neutral zone is totally ineffective in passing air; and extreme openings near roof and floor of a building, are most effective.

3. The position of the neutral zone, between roof and floor of a one-story building, is governed by the relative amount of opening provided at top and bottom, and by the difference of temperature between inside and outside air at different levels.

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With equal area and symmetrical arrangement of openings at top and bottom, and with uniform temperature difference throughout, the neutral zone will be at mid-height. If the area provided in upper sidewalls and roof is larger than that near the floor, the neutral zone will be displaced toward the roof; and similarly, if the lower area preponderates, the neutral zone will be displaced toward the floor. If the temperature difference between inside and outside air is less for the lower levels than for the higher, the neutral zone will be displaced toward the roof. In general, the neutral zone is displaced toward the group of openings of larger area, and toward the region of higher temperature difference.

The discussion was typified by the statement of Professor Willard that the paper represented a distinct and important contribution to the science of ventilation.

Claude A. Bulkeley was the recipient of a vote of thanks for his presentation of a new form of psychrometric chart, in which, by the use of a logarithmic ordinate scale, he graphed the findings of the Carrier rational formula, so that, as Mr.Carrier later expressed it, there was "combined in one chart all that could be covered with three charts plotted in the accepted form." Mr. Bulkeley stated that, with the approval of the E. I. DuPont des Nemours Company, he desired to place this chart at the disposal of the society, for copyright by it, and for such sale or other use as the society might determine. This offer was accepted by vote.

The discussion of proposed amendments to the constitution quickly resolved itself into almost complete agreement in favor of the first five amendments as recommended by the council, and the rejection of the last two. Action was taken on these amendments severally.

It was suggested in place of the amendments Nos. 7 and 8, that the by-laws be amended to provide for the election of the nominating committee by composing that body of a delegate from each chapter. This was countered by Mr. Gillham with the suggestion that the committee be composed of elected delegates from five or seven territorial divisions, submitting a proposal for this division that would result in each area being almost equally represented in the membership.

Material differences of opinion developed, based mainly on the question of how the territorial selection could be carried out. Appearing to be largely a question of method, rather than principle, the solution appeared in a resolution that the chairman appoint a committee to consider the factors developed in the discussion and to draft an amendment or amendments embodying the ideas as expressed by Messrs. Hill and Gillham, to be mailed to the members for final vote.

Afternoon Session, January 29

The concluding session of the meeting was opened with a paper by F. E. Hartman, chief engineer of the United States Ozone Company, on "Has Air a Vital Property?"

Has Air a Vital Property?

Mr. Hartman first called attention to the comfort zones, as established by the society's Research Laboratory and characterized this work as one of the most comprehensive pieces of research known to the physical sciences. He then spoke of the "murmurings of rumors of a return to window ventilation with gravity exhaust" and declared that the personal experience of every engineer will tell him that to produce the optimum conditions of temperature, humidity, etc., a mechanical ventilating plant of the highest order is required. However, he asked, is the engineer justified in stopping there, since we are agreed that there is still something lacking that prevents comparison with outdoor conditions?

Mr. Hartman spoke of the importance of oxygen in the air and how air is deionized in passing through a mechanical ventilating system, thus losing much of its chemical activity. This, he felt, was the essence of the problem and he suggested as the main reason for the use of ozone in ventilating work, its effect in restoring to the air of buildings its normal chemical activity.

Mr. Hartman's arguments were to the effect that there is some vital substance in the air of nature and he suggested that ionization is the "air soluble vitamin." Herein, he concluded, perhaps, lies the grain of truth to the exponents of window ventilation, for they have recognized the vital quality of outside air, but have overlooked a host of other factors.

In the discussion Edwin S. Hallett said that no less than 80,000 school children in St. Louis are enjoying the benefits of ozone at the present time. In the use of ozone in St. Louis, no ill effects had ever been reported on the part of teachers or scholars.

The final paper on the program described some of the first actual records of operation of the warm-air furnace heating system in the Research Residence of the N. W. A. H. & V. A. in Urbana, using a recirculating duct located in the lower main hall. The paper was prepared by Professor V. S. Day of the University of Illinois and was presented by Professor A. C. Willard.

Temperature Conditions Existing in the Rooms of Residences Heated by a Gravity Warm-Air System

Professor Day's paper described a test made in the Research Residence of the National Warm-Air Heating and Ventilating Association, during one heating season. The system was arranged with a return-air pipe leading back to the furnace from the central hall of the residence. The pipe sizes were calculated from the association's standard code. A thermostat set at 70° F. controlled the draft-door movements. At the same time a recording thermometer graphed the outdoor and indoor

temperatures. In each room thermometers were located, one at the breathing line, one 4 in. above the floor and one 4 in. below the ceiling.

For the period the dry-bulb temperature outdoors averaged 36.6° F. and the average readings of the thirty thermometers in the residence was 68.13° F. At the breathing level the average dry-bulb temperature was 68.9°. From this figure the coldest room varied only 2.8° low and the warmest room 2.3° high. No effort was made to adjust the room temperatures by manipulation of pipe or register valves. All pipes were full open.

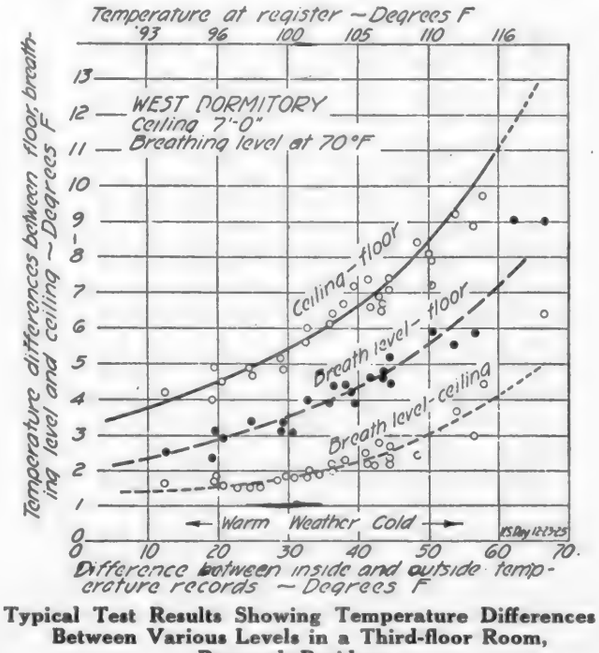
Between different levels in the rooms marked variations in temperatures existed. These differences, it was found, may be correctly expressed as functions of the indoor-outdoor temperature differences.

One of the tables contained in the paper expressed the data obtained from the test in terms of temperature differences per foot of height, from which it appeared that the coefficient of temperature increase per foot of height was approximately 2.5° in zero weather, and 1° in freezing weather. This figure compares with that obtained by Reitschel for a variation in air temperature above or below a breathing-line temperature of 70° in a room 10 ft. high and with an outside temperature of 0° F., of 2° F. per foot of height.

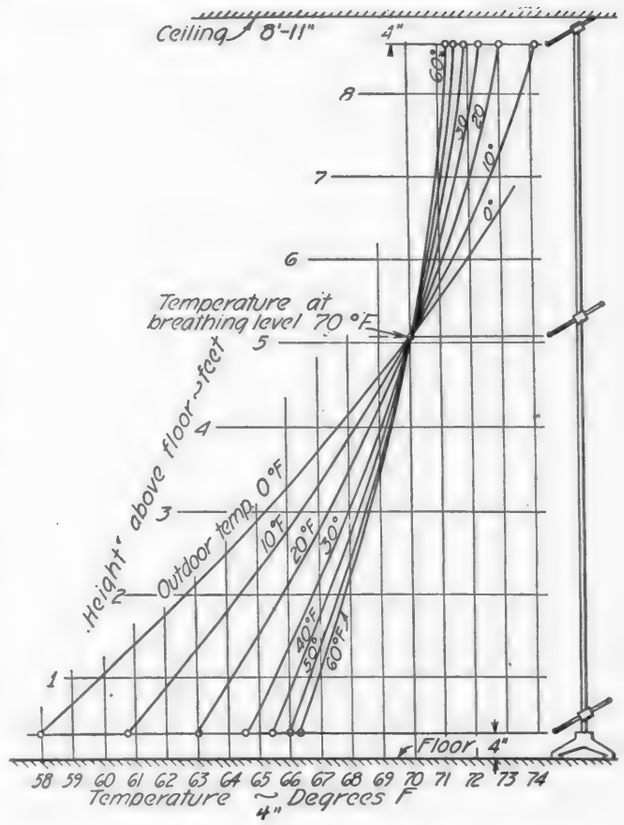
H. M. Hart and F. R. Still acted as a committee to escort the newly-elected officers to the dais, where they were received by the retiring president.

After the installation ceremonies, under new business, it was voted to appoint a committee to draft a standard method of testing air filters.

Acting upon an invitation of Dean Anderson the meeting went on record as favoring Lexington, Kentucky, as the place for the society's next midsummer meeting. For the next annual meeting an invitation from E. B. Langenberg to come to St. Louis was favorably received and a vote taken to that effect as expressing the sentiments of the


Temperature at register — Degrees F
93 96 100 105 110 116
WEST DORMITORY
Ceiling 7'-0"
Breathing level at 70°F
Ceiling - floor
Breath level - floor
Breath level - ceiling
Warm Weather Cold
Temperature differences between floor, breathing level and ceiling — Degrees F
Difference between inside and outside temperature records — Degrees F

Typical Test Results Showing Temperature Differences Between Various Levels in a Third-floor Room, Research Residence



Graphic Method of Showing Temperature Variation at Different Heights in Reception Room

meeting. Later, at a meeting of the council, Lexington, Ky., was definitely decided upon for the summer meeting, the dates being May 26-28. St. Louis was chosen for the next annual meeting, to be held January 26-28, 1927.

The council appointed A. V. Hutchinson secretary of the society, in addition to his duties as manager of publications.

The meeting then adjourned.

Solving the Automobile Parking Problem

As traffic increases in the large cities the parking problem grows more acute. It is clear, as a writer in *Safety Engineering* observes, that its solution lies in utilizing either sub-surface or above-surface space, probably both.

In the case of the Pacific Telephone and Telegraph Building, in San Francisco, a portion of one of the basement floors has been reserved for parking cars. To facilitate the handling of the cars, a modern turntable has been provided. It is anticipated that this arrangement will soon give rise to the need of providing special ventilation for these spaces, besides isolating them from the rest of the building.

From Washington comes an account of another method of solving the problem. An owner of a building in the busiest section of the Capital has converted his roof into an open-air garage for the accommodation of his own and other cars. In this particular building the roof has a capacity for some forty cars.

Buffalo Provides Lavish Hospitality

BUFFALO fairly outdid itself in the entertainment of its guests throughout the meeting. The new Hotel Statler where the sessions were held, proved a most attractive headquarters.

A novelty on the opening night of the meeting was an informal dance in the grill room of the hotel, followed by a smoker for the men and a separate entertainment for the ladies.

The society's annual dinner was held at the Hotel Statler on the second day of the meeting and proved one of the largest attended affairs of its kind in the history of the society. A guest of honor was Dr. C.-E. A. Winslow, who but an hour before had been the center of a storm of discussion of open-window school ventilation. He had to leave before the dinner was over, but was presented to the diners by Dean F. Paul Anderson and given a warm greeting.

President W. G. Fraser of the Western New York Chapter acted as toastmaster. The speakers included the retiring president, Samuel E. Dibble; the incoming president, Wm. H. Driscoll; and Dean Anderson, who at the close of his talk, presented President Dibble with a gold replica of the society's emblem.

The final speaker at the dinner, the Reverend Mr. McAlpin, of Buffalo, emphasized the high place of the art of heating and ventilation in the life of the nation and compared the services of the heating and ventilating engineer in the promotion of human health and happiness to the high calling of the ministers of the gospel in promoting the health of the soul.

Following the dinner the banquet hall was cleared for dancing which continued until a late hour.

On Friday the ladies were taken on a special trip to Niagara Falls where they were joined by the men late in the afternoon. The party had dinner at the Hotel Niagara and afterwards were taken by motor bus to see the night illumination of the Falls, made doubly impressive by the complete choking of the American side by an ice jam.

The committee on arrangements which so successfully carried out the plans for the meeting, was headed by W. G. Fraser, and included Roswell Farnham, treasurer, and the following sub-committee chairmen:

C. H. Love, entertainment; H. P. Dempsey, hotel and transportation; F. B. Howell, speakers; C. W. Farrar, publicity; C. P. Wadley, registration; George H. Drake, reception; and Mrs. C. H. Love, ladies. In addition district chairmen who worked with the committee, included F. J. Weider, Rochester; Professor A. R. Acheson, Syracuse; P. W. Schneider, Utica; J. W. Gannon, Erie; and B. C. Davis, Elmira.

Past Presidents' Dinner

In accordance with a custom established last year the past presidents of the society held a dinner and reunion on the opening night of the meeting at the Hotel Statler. Those present were President S. E. Dibble and Past Presidents E. Vernon Hill, Homer Addams, H. P. Gant, John F. Hale, H. M. Hart, Samuel R. Lewis, Champlain L. Riley, and F. R. Still.

President Wendt Guest of Buffalo Forge Alumni

Former Buffalo Forge men, many of whom have made notable successes in separate lines of business, gathered at the Hotel Statler for luncheon, Thursday, January 28, having as their guest of honor President H. H. Wendt, of the Buffalo Forge Company. In a signed tribute to President Wendt, the "alumni" of the company went on record as expressing to Mr. Wendt "their very best wishes for a long and happy and prosperous life and continued business prosperity."

"In our reminiscences," they added, "you have been much in our thoughts and with the kindliest feelings we desire, each one personally, to extend to you the above greetings."

The testimonial was signed by each "alumnus," the list including William G. R. Braemer, Willis H. Carrier, J. F. Brightman, H. Rice, E. T. Murphy, Thornton Lewis, A. E. Stacey, Jr., R. T. Coe, William A. Roe, E. A. Hall, J. C. Coe, J. C. Evans, B. L. Cushing, M. C. Beman and J. J. Yager.

Visit to American Radiator Company's Plant

Thursday morning half a hundred delegates made an inspection trip to the Bond Street plant of the American Radiator Company, and to its Institute of Thermal Research. In the plant the visitors were segregated into conient groups and personally conducted through the various departments, from the foundry to the packing and shipping rooms. The elaborate and accurate methods of production were explained, as well as the work of the testing department. No small interest was created by the operation of surface-grinding the huge sections of rectangular boilers, and in the conveyor method of handling fire-pot sections and other elements for successive operations.

The party then moved to the laboratory, where it was welcomed by Director Frank B. Howell and other members of the staff. The research work under way was outlined, and every opportunity given to ask questions, pertinent to impertinent. The laboratory appeared to be much more interesting than the manufacturing plant, and those in charge found it difficult to start the party moving hotelward on scheduled time.

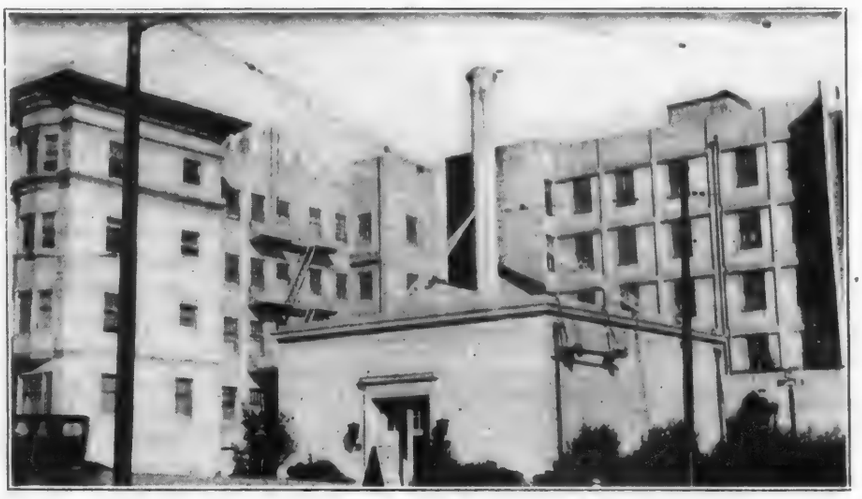
Unit Heater Manufacturers Get Together

Thirteen manufacturers of unit heaters met at the Hotel Statler Tuesday night to make plans for effecting a permanent national organization. The possibilities of such an organization were discussed and when adjournment was taken it was with the intention of meeting again at the next midsummer meeting of the society.

Concrete Heating Station for San Francisco's Civic Center

The accompanying photograph shows the artistic heating station in the San Francisco Civic Center which supplies steam for heating the buildings of the Civic Center group, consisting of the City Hall, municipal auditorium, public library and emergency hospital. The heating plant is located at the corner of Larkin and McCallister Streets, San Francisco, and was designed so that two wings can be added in the future when the demands for more steam require this.

The building is designed to harmonize with the beautiful buildings that are a part of the Civic Center scheme. The heating plant is surrounded with shrubbery and the entrance is provided with two artistic lights.



Central Heating Station in San Francisco's Civic Center

American Society of Heating and Ventilating Engineers

Illinois Chapter to Have Monthly Bulletin

A proposal to establish a monthly chapter bulletin was unanimously approved at the January meeting of the Illinois Chapter, held January 11, at the Hotel Sherman, Chicago. In a report on the subject, presented by A. G. Sutcliffe, a four-page leaflet, 8½ by 11 in. was recommended. The main object of such a bulletin would be to maintain the interest in the chapter's activities among the members and to be a means of bringing in new members. It is proposed to publish the bulletin during the summer months, as well as during the balance of the year.

It was suggested that the members be content to have no illustrations and that no advertising be solicited or carried. The cost of the bulletin was estimated at $45.00 per month which would be paid out of the chapter's treasury.

The meeting was featured as the chapter's annual "stunt" night. One of the "stunts" discussed was in connection with the removal of oil, core sand and other foreign matter from boilers. Frank H. Gaylor related his experiences with compounds to overcome this difficulty.

In relating experiences with oil-burner installations, H. M. Hart told of an apartment building equipped with three Kewanee boilers where the oil-burner distributor had installed one burner in one of the boilers to carry the load for all three of the boilers. Mr. Hart stated that most of the troubles encountered on oil-burner installations were due to the fact that not enough oil-burner manufacturers and dealers are working with heating engineers and contractors. In the illustration just given, he said, had the dealer consulted with the heating contractor on the building, the trouble would have been averted.

Mr. Kehm stated he had found round boilers objectionable for use with oil-burners since they did not seem to carry the load. Mr. Hart suggested that one remedy for this condition would be to disconnect the thermostat and operate from an aquastat.

President Martin stated that it was unfortunate the majority of oil-burner men have had no previous training or experience in heating. With the grief they are necessarily having, they are certain to realize eventually that they need heating men in their employ, men who know the application of oil-burners to boilers and heating systems.

Mr. Kehm told of two adjoining houses, exact duplicates, owned by two brothers. Each had the same amount of radiation load and the same kind of heating systems. Both men kept close and complete records of their heating costs. Over two seasons the house having a gas boiler was found to be running 10% less in cost than the adjoining house which had an oil-burner.

W. B. Graves told of a job in which the boiler had been burned out. The trouble, it was found, was due to the fact that the oil-burner was operating on a three-phase current and the pump on the house circuit. When the pump stopped the oil-burner kept on.

CHAPTER'S ACTION ON CONSTITUTIONAL AMENDMENTS

A large part of the evening was given over to the report of the Committee on Constitution Amendment, of which Dr. E. Vernon Hill was chairman. This report was read by John F. Hale. Among the more important points taken up were the holding of annual meetings of the society in other cities than New York, the election of the council by general ballot after candidates had been nominated by chapters, and the plan to have the various chapters represented on the nominating committee of the society.

The report was against Amendments 1, 2, 3 and 4, but recommended the adoption of Amendment 5. Amendment 6 was rejected and Amendment 7 adjudged unnecessary if the change recommended in Section 2 of Amendment 6 was made. The report was accepted and ordered sent to the western chapters.

The chapter adopted a suggestion offered by J. C. Hornung that the society be invited to hold its summer meeting at Mackinac Island.

New members elected are: L. J. Pitcher, Illinois Engineering Company; A. E. Olson, Chicago Board of Education; H. DeWitt Valentine, People's Gas Light & Coke Company; and Eugene Mathis, Duro Air Filter Company.

New York Chapter Holds Joint Meeting with A. S. M. E. Section

A discussion on "Burning Anthracite Substitutes in Small House-Heating Boilers," scheduled by the Fuels Division of the Metropolitan Section of the American Society of Mechanical Engineers, was made the occasion of a joint meeting with the New York Chapter, A. S. H. & V. E., in the Engineering Societies Building, New York, January 18. Henry Kreisinger, research engineer for the Combustion Engineering Corporation, New York, and F. R. Wadleigh, formerly United States Fuel Administrator, were the two principal speakers.

Mr. Kreisinger confined his talk to such substitute fuels as could be burned without making radical changes in the boiler. He characterized coke as the nearest substitute, including in this category by-product and gas-house coke. The principal requisite in burning coke, he said, is to have the furnace large enough. Coke bulks one-third more than anthracite but contains one-third, or more, less ash.

Next in the order of substitutes he placed coking bituminous coal, following this with free-burning bituminous coal.

Mr. Kreisinger showed a number of lantern slides indicating the results of burning anthracite coal, coke and soft coal in Capitol, Dunning and Arco boilers. In each case the soft coal could only be used at low rating due to the high flue temperatures obtained with rapid combustion. Burning hard coal and coke the boilers developed efficiencies up to 70%. The coke and hard coal curves paralleled each other very closely.

In connection with bituminous coals, Mr. Kreisinger brought out the wide difference in the characteristics of such coal, depending upon its source. The Pocahontas and New River coals, he described as the most suitable for domestic heaters, followed by Pittsburgh coal, Illinois coal and so on, down to lignite. Boiler ratings, he stated, should include the capacity of the fire-pot.

Mr. Kreisinger described the coking methods he had used in firing a round boiler in his own home in Pittsburgh, using Pittsburgh coal. His plan was to scoop out a cavity in the front of the fire-bed banking the fire at the rear, then to fire fresh coal in the cavity made, filling the firepot up to the top of the fire door.

He suggested the following as a set of rules for firing coke in domestic heaters:

1. Carry deep fuel bed, and use coking method of firing.
2. Have draft under control.
3. Remove clinkers in morning or when fire is comparatively cool.
4. Use sizes from ½ in. up to 2 in.
5. Do not allow ash to accumulate in the ashpit.

Francis R. Wadleigh presented a paper which dealt with many phases of the industry, including the mining and preparation of hard and soft coals and coke for the market. All of the coals, he declared, can be burned without smoke, with proper equipment.

In the ensuing discussion, Dr. C. W. Brabbee endorsed the use of coke and urged its establishment as standard practice in househeating work. Boilers, he said, should be designed to burn anthracite substitutes and the American Radiator Company is considering the problem involved in connection with a boiler that will burn all hard fuels.

One speaker said that the need of the day is for a boiler that will burn satisfactorily run-of-mine bituminous coal. We have untold quantities of that, he said, and for that reason alone, its use is bound to become general.

Arguments were also advanced for the use of forced-draft appliances, especially where the difference in price more than

overbalanced the cost of electric current required to operate the draft fan. This cost was placed by one speaker at 50 cents per ton of coal consumed.

Philadelphia Chapter's Annual Frolic

Three hundred members and guests of the Philadelphia Chapter responded to the summons of Harry G. Black and his entertainment committee for the tenth annual meeting and dinner of the Philadelphia Chapter, held January 14, at McCallister's, Philadelphia. Toastmaster Beahm had charge of the festivities.

President R. P. Schoenijahn paid a tribute to the officers who had served with him during the year and told of some of their accomplishments. Secretary Lord was authorized to cast one vote for the following ticket as nominated:

President, Ben Adams; vice-president, R. E. Jones; treasurer, James V. Cavileer; secretary, Stephen S. Whitby; board of governors: R. P. Schoenijahn, Benjamin Wilson and H. G. Black.

Former President Homer Addams expressed his keen pleasure at being present and gave some inspiring thoughts on good fellowship through society membership. William H. Driscoll, now president of the society, recalled the work of the society's founders and paid tribute to the four charter members in attendance, Homer Addams, A. S. Mappett, J. J. Wilson and Stewart A. Jellett.

"Sir" Frederick Magill, "of London," a well-known English engineer, who was a guest of honor, was then introduced and his talk proved a treat. He spoke most entertainly of his five months' visit to the United States.

His keen sense of humor and the shafts that he poked at American institutions caused gales of merriment and were enthusiastically applauded. He mentioned the wonders of American organization, the charm of the ladies, and paid his respects to prohibition and paid reformers and explained a few of the things, which, in his opinion, the United States needed more than a good five-cent cigar.

He marvelled at America's speed, particularly as he had the morning paper before going to bed and, when it was time for breakfast, evening papers were out.

After several acts of vaudeville had been enjoyed, an original revue, entitled, "Research" was given. It depicted a hospital scene with four patients, Messrs. Walther, Francis, Bolsinger, and Alec McClintock, Jr., as patients who were most unruly and almost gave the beautiful nurse gray hair. Dr. Hackett prescribed after hearing the patients' symptoms, as outlined in song by the nurse, and finally discovered a remedy in the Society's Research Bureau.

It was a most entertaining tabloid revue, but all efforts to have the authors make a speech were futile, as they wished to remain anonymous.

84% Combined Efficiency of Winslow Industrial Oil Burner and Kewanee Boiler

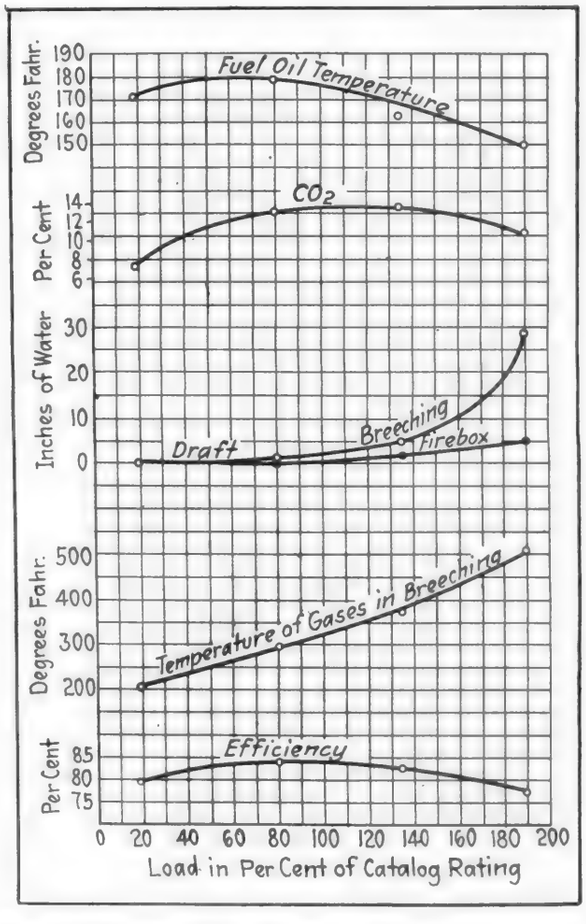
Through an unfortunate error, due to a transposition of two charts shown on Page 75 of THE HEATING AND VENTILATING MAGAZINE for January, it was made to appear that the combined boiler efficiency with a Winslow type of industrial oil burner, installed in a Kewanee boiler, ranged from 78.4% to 82.3%. In reality, the overall efficiency of this combination, in one case, ran as high as 84%.

The accompanying chart, which carried the wrong caption in the January issue, is here reproduced with the correct caption showing the operating characteristics of the No. 317 Kewanee boiler, equipped with the Winslow industrial type oil burner.

In commenting upon this test and upon our January article, Mr. H. J. G. Rudolf, manager of the Industrial Division of the Winslow Boiler and Engineering Company, writes:

"The tests on Winslow were completely successful, showing a range of operation from 18.8% of catalog rating to 189.5% of catalog rating, and what is more remarkable, an overall boiler and furnace efficiency of 84% at 80% of the boiler rating. This is a pronounced advancement in the art of oil-burning. An 82.3% efficiency was certainly good but has often been beaten. It is something totally inferior to the 84% which is an outstanding accomplishment.

"The error in your January issue is particularly unfortunate because the Kewanee Boiler Company has taken a full page in the same issue of your magazine, which starts off with 84% boiler efficiency obtained with oil-burners. Since it was actually obtained with Winslow equipment, the transfer of credit to a competitor is distressing."



No. 317 Kewanee Boiler Operating Characteristics with Winslow Industrial Type Oil Burner

Fourth Annual Secretaries' Conference

The sale of 30% of the heating and plumbing goods manufactured in this country through other channels than heating contractors and master plumbers, a call for closer co-operation with the gas industry in merchandising gas-burning appliances and eliminating the sale and installation of poorly-made material, credits and collections, the installment plan of payments, and accounting, were the high spots of a three-day conference of association secretaries, held under the auspices of the National Trade Extension Bureau, in Evansville, Ind., January 11-13. Ten secretaries of heating contractors' associations and about fifty secretaries of master plumbers' associations were in attendance.

The situation in the industry whereby 30% of the heating and plumbing goods are sold through other than legitimate channels, such as mail-order houses, factories and shyster jobbers, was presented by President Henry E. Longley, of the National Association of Master Plumbers. Major Alexander Forward, secretary-manager of the American Gas Association, spoke for the gas industry, and W. C. Brooks, of the Credit Alliance Corporation, New York, presented the favorable features of the installment plan of payment.

United States Boiler Corporation Guarantees Its New Boiler Ratings

UNDER the slogan of "Guaranteed Heating," the United States Radiator Corporation, Detroit, Mich., announces an important step in the movement to simplify and place upon a more accurate basis the rating of house-heating boilers. It offers a guarantee of the capacities of its boilers in definite terms of cast-iron radiating surface that can properly be heated by each Capitol boiler it manufactures.

Alongside its new guaranteed ratings are given the old catalogue ratings for the same boilers. The new figures run about 50% below those formerly used, which makes the sizes conform closely to those actually selected by engineers for a given duty.

In its announcement the company makes the point that in choosing the correct size of a boiler for any building there is one, and only one consideration: will it properly heat the required number of square feet of radiation? The net cast-iron radiating surface that each type and size of Capitol boiler will heat adequately, continues the announcement, has been definitely determined and is now officially published. In addition the capacities given are guaranteed in writing. The new guarantee reads:

THE COMPANY'S GUARANTEE.

"The United States Radiator Corporation will give with each Capitol boiler sold an absolute guarantee in writing that it will properly heat its full published amount of direct cast-iron radiation, provided only that the boiler is connected to a correctly-installed system and that the recognized standard requirements listed herein are followed. Should any Capitol boiler not meet these conditions, the additional capacity necessary will be supplied without charge by the United States Radiator Corporation."

Under "Standard Requirements," are taken up direct cast-iron radiation, corrections and allowances; draft and fuel. It is assumed that direct cast-iron radiation will emit 240 B. T. U. per hour for steam and 150 B. T. U. per hour for water and the guarantee holds where all radiation is reduced to this heat-emission basis.

The amount of radiation required on this basis may be thus computed or it may be computed from the methods adopted by either the Heating and Piping Contractors Association or the American Society of Heating and Ventilating Engineers. (A series of data sheets giving full details of the method of the Heating and Piping Contractors Association commences in this issue of THE HEATING AND VENTILATING MAGAZINE).

Under ordinary conditions the approximate corrections, states the company, will reduce the following loads to their equivalent of direct cast-iron radiation:

Direct-indirect, multiply by 1.25; indirect, multiply by 1.50. For blast coils, determine the condensation in pounds of steam per hour and multiply by 4. For domestic hot water supply, storage tank capacity in gallons: for steam, multiply by 2; for water, multiply by 3.2.

The boiler size guaranteed for direct cast-iron radiation includes allowances for heat losses from the piping system and for peak loads. Where the actual surface in square feet of the piping system exceeds 25% of the direct cast-iron radiation for steam, or 35% for water, additional allowances must be made for the extra surface.

In the matter of draft, the provision is that the boiler must be attached to a chimney providing sufficient draft to consume with proper combustion the required amount of fuel per hour.

As for fuel, the size of boiler recommended is based upon the use of a free-burning coal not smaller than nut size and having a heat value of at least 13,000 B. T. U. per pound. When the coal to be used has a heat value of less than 13,000 B. T. U., the computed radiation must be multiplied by the factor corresponding to the heat value of the coal. These factors are:

Heat Value of Coal in B. T. U. per pound.	Factor
13,000	1.00
12,500	1.07
12,000	1.14
11,500	1.21
11,000	1.29
10,500	1.37
10,000	1.46
9,500	1.56
9,000	1.67
8,500	1.79
8,000	1.92
7,500	2.06
7,000	2.21
6,500	2.36
6,000	2.53

Guaranteed and Catalog Ratings of Capitol Smokeless-Type Boilers

GUARANTEED HEATING IN DIRECT CAST IRON RADIATION SQ. FT.		BOILER SIZE NO.	CATALOG RATING SQ FT	
STEAM	WATER		STEAM	WATER
1000	1650	627	1800	2975
1225	2020	727	2200	3625
1450	2390	827	2600	4275
1675	2760	927	3000	4925
1900	3135	1027	3400	5575
2125	3505	1127	3800	6225
2350	3875	1227	4200	6875
2500	4125	740	4475	7350
3000	4950	840	5250	8650
3500	5775	940	6025	9950
4050	6680	1040	6800	11250
4500	7425	1140	7575	12550
4900	8085	1240	8350	13850
5400	8910	1340	9125	15150
4700	7755	750	7800	12875
5350	8825	850	8850	14600
5850	9655	950	9900	16325
6500	10725	1050	10950	18050
7000	11550	1150	12000	19775
7650	12620	1250	13050	21500
8150	13450	1350	14100	23225

Building Construction for 1925 Nearly $7,000,000,000.00

That the 1925 construction volume would pass all previous records was practically assured at the end of October, and the principal interest in the December report of the F. W. Dodge Corporation is the fact that the total for the year aggregated well over $660,000,000.00, and that the rate of construction continued up to the last day of December, showing no signs of decline. The December record itself was something over a half billion dollars, by far the highest December figure ever recorded. It is also interesting to note that the December total exceeded that of November, which is unusual.

The report states that the year 1926 opens with construction continuing at a record rate and practically no indication yet in sight of any slowing down within the next few months. Should there be any slowing down during 1926 it does not seem likely to occur until after the spring season has passed. Some observers look for a reaction some time in 1926, while others anticipate an even greater volume than in 1925. Even the most conservative business men will expect a very large building volume, particular during the first half of the year.

Washington Selected for Next Annual Convention of Heating and Piping Contractors

Arrangements have been made to hold the thirty-seventh annual convention of the Heating and Piping Contractors Association in Washington, D. C., June 1-4, 1926. Headquarters will be at the Willard Hotel. The association twice before has met in Washington when it was a much smaller organization and the forthcoming meeting will furnish an interesting comparison between its size at that time and its growth in numbers and importance during the intervening years.

Educators and Medical Men Launch Combined Attack on Mechanical Ventilation

IF any evidence were needed to prove that there is a concerted movement on the part of health officials and educators to discredit all forms of mechanical ventilation, it is furnished by the report of the Joint Committee on Health Problems in Education, representing the National Education Association and the American Medical Association. The report is dated 1925.

The chairman of the committee is Thomas D. Wood, of Columbia University, New York. Representing the National Education Association on the committee are:

Robert J. Aley, president, Butler College, Indianapolis, Ind.;

Katherine D. Blake, principal, Public School No. 6, New York;

Mrs. Mary C. C. Bradford, State superintendent, Public Instruction, Denver, Colo.;

William D. Burdick, State supervisor, Physical Education, Baltimore, Md.;

William H. Burnham, Clark University, Worcester, Mass.;

F. B. Dresslar, Peabody College, Nashville, Tenn.;

J. O. Engleman, director, Field Work, N. E. A., Washington, D. C.;

Emily Griffith, president, Colorado Education Association, Denver, Colo.;

Clark W. Hetherington, director, Department of Physical Education, New York University, New York;

John F. Keating, superintendent Public Schools, Pueblo, Colo.;

Mary E. Murphy, director, Elizabeth McCormick Memorial Fund, Chicago, Ill.;

J. B. Nash, supervisor, Physical Education, Public Schools, Oakland, Cal.;

William B. Owen, principal, Chicago Normal College, Chicago, Ill.;

Mrs. Josephine C. Preston, State superintendent, Public Instruction, Olympia, Wash.;

Ruth Pyrtle, principal, Junior High School, Lincoln, Neb.;

Homer H. Seerley, president, State Teachers College, Cedar Falls, Ia.;

John J. Tigert, U. S. Commissioner of Education, Washington, D. C.;

Blanche M. Trilling, professor of physical education, University of Wisconsin, Madison, Wis.;

Agnes Winn, director, division of Classroom Service of N. E. A., Washington, D. C.;

Albert E. Winship, New England Journal of Education, Boston, Mass.

Representing the American Medical Association are:

John M. Dodson, M. D., American Medical Association, Chicago, Ill.;

R. W. Corwin, M. D., Minnequa Hospital, Pueblo, Colo.;

Essentials of Window Ventilation

(As Defined by Joint Committee on Health Problems in Education, Representing National Education Association and American Medical Association.)

1. **Windows open.**
2. **Outlets for vitiated air placed in wall opposite windows.**
3. **Deflecting boards at bottom of windows to direct the entering air upward.**
4. **Double window shades adjustable from both top and bottom, to prevent movement due to air flow.**
5. **Radiators the width of windows, or wider, placed under the windows.**
6. **Radiator shields to protect pupils from heat.**
7. **Temperature 68° F. or slightly less.**
8. **Thermometer with danger signal pointed at 68° F.**
9. **Cubic space allowance of at least 250 cu. ft. for each second grade and 310 cu. ft. for each sixth grade child.**
10. **Intelligent control by engineer and teacher.**

Edward Jackson, M. D., Denver, Colo.;

Henry L. K. Shaw, M. D., Albany, N. Y.

As the report states, this committee, for some years, has been making a study of heating and air condition in school rooms. It is stated very frankly that the committee has been largely influenced in taking its present stand by the findings of the New York State Commission on Ventilation. A large part of the report is made up of quotations from data published by the New York Commission, all in an effort to prove that window ventilation, with provision for outlet through gravity ducts, was found the most satisfactory method.

Under "Examples of Successful Window Ventilation," the report cites the system installed in the Sherman School in Fairfield, Conn., and in the Longfellow School, in Bridgeport. These schools are equipped with windows along one side of the room provided with wind shields 10 or 12 in. high, resting on the inside of the window sills and held upright in place against the face of the window casings by screw hooks. Radiators are placed below the windows the full width of the window space which is used as an inlet. Outlets leading to the roof are installed on the opposite side of the room. Large rooms are provided with two outlets.

Repeated observations of these schools, states the report, indicate the success of the method. Principal and teachers are enthusiastic over it, and pupils apparently are more alert than in a mechanically ventilated room.

The Thomas Snell Weaver High School, Hartford, Conn., designed by Frank Irving Cooper, is cited in the report as a notable example of window ventilation on the Wheeler plan, with certain modifications. The "hospital" type of radiator is used. Shields have been placed in front of the radiators. The radiators are of sufficient length to extend over the entire width of the window and 3 in. beyond on each edge. Steam is fed to the radiators through a pipe placed over the radiators and extending the width of the window just below the deflectors, the pipe is so installed that it will contain live steam whenever steam is being used for heating purposes. Whenever possible, the automatic control valves on the radiator are used, the thermostat being located on the inside wall of the class room. The results obtained will be particularly significant because of the size of the school, which is designed to accommodate 1,300 pupils, built at a cost of $1,500,000.

DIFFICULTIES DUE TO PRESENT LAWS

"In many States," adds the report, "window ventilation is made impossible because of laws requiring 30 cu. ft. of air supply per pupil per minute, which window ventilation cannot provide. These laws were the result of the belief that air change was the main issue in good ventilation—a belief which recent studies have proved to be mistaken."

Dr. C.-E. A. Winslow, Chairman of the New York State Commission on Ventilation, is quoted in the report as stating that:

"If our conclusions are justified, the laws requiring what proves to be an excessive flow of air through the school room should be repealed, opening the way for the use of the system of ventilation by window supply and gravity exhaust, with a lessened flow of cooler air and a simultaneous reduction in educational appropriations and respiratory diseases."

In States where at present window ventilation is impossible because of laws now on the statute books, the committee recommends the revision of legislation in regard to school ventilation which will permit of window ventilation.

FINAL RECOMMENDATIONS OF THE COMMITTEE

After a careful review of the results of recent investigations in regard to ventilation of school buildings, the

Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association recommends modified window ventilation for school rooms, according to the method already outlined. These recommendations are based on the following facts:

1. Window ventilation with gravity exhaust makes possible the degree of temperature, amount of humidity, amount of air movement desirable for school rooms.

2. The above characteristics of window ventilation with gravity exhaust are factors contributing to the health of occupants and to a lower incidence of respiratory diseases.

3. These characteristics contribute to comfort and a more attractive atmosphere.

4. Ventilation by windows according to the method described is more economical to install and should be more economical to operate than an artificial system.

To work satisfactorily any plan must be under the attentive control of an intelligent, interested person.

In States where at present there are laws requiring 30 cu. ft. of air supply per pupil per minute, the committee recommends revision of legislation which will permit of window ventilation not now possible under such laws.

Pros and Cons of the Time-Payment Plan

ARGUMENTS pro and con regarding the time-payment plan in general and as applied to the heating industry are presented in the *Owcial Bulletin* of the Heating and Piping Contractors Association for January, 1926. The negative side of the question is presented by J. B. Walker, secretary of the Heating and Piping Contractors Pittsburgh Association.

"When you apply the idea of partial payments to heating apparatus," he states, "you have a very different situation from that of many dealers who use this plan as a part of their business procedure, such as those who trade in furniture, victorias, pianos, etc. The articles these dealers sell never cease to be their property until they are fully paid for. They are never attached to a house nor do they become a part of that house. In heating apparatus, I think the laws in nearly all of the States would not permit a removal from the premises after once the apparatus has been placed in position, while in this State (Pennsylvania) one cannot remove it even though it is quietly resting in the back yard.

"It is very good business to encourage trade by any and all legitimate methods but when the partial-payment plan is suggested and urged, it would seem as though its operation would be greatly to the advantage of the manufacturer, who assumes no risk whatever and has none of the annoyances of partial-payment collection, rather than the heating contractor, who has to obtain the contract, install the work, assume the risk and collect when and how he can. Recently in a conversation with a large music dealer in Baltimore, Md., he said that the partial-payment idea was the worst feature that had ever entered their business and gave them more trouble and a greater proportion of loss than all other elements put together.

"The suggestion of using a bonding company to eliminate the risk removes one objection from the plan but, in turn, adds another in the additional cost it places on the owner who, under the present conditions of high cost of material and labor, is certainly paying quite enough for his heating apparatus.

"I do not know that any of our members have ever made contracts in this way; if so, certainly in only limited cases and amounts. We do not suggest it as an advisable plan nor encourage it as a possible method of trade increase. We feel that a damaging precedent has been set before the American people by the automobile industry resorting to this scheme for selling machines. It induces people to attempt to purchase who, under no conditions, should undertake to own an automobile, who cannot afford it and who are often very much embarrassed even to the extent of mortgaging their homes to finally pay for it. It is very difficult to argue from the principle already quoted, that is certainly the basis of success in all well-founded establishments, of paying as you go."

THE ARGUMENT FOR THE PLAN

Speaking for the plan, M. J. Beirn, assistant general manager of sales of the American Radiator Company, makes some telling points. "The installment plan," he states, "is not a new method of merchandising, not by any means. It is an old time-tried and time-tested method that is being made use of more freely in order to promote the greatest good of the greatest number. It certainly stimulates business—improves living standards—encourages the budget system, and, you might also say, enforced thrift.

"What are we worrying about—the financial structure? Well, it has had some severe shocks in the past, but when you consider that even admitting the amount of credit for which installment sales are held responsible and bear in mind these figures range from $3,000-000,000 to $10,000,000,000, we fimly believe that our financial structure is sufficiently comprehensive and elastic to take care of the situation without feeling any undue strain.

"Installment sales have increased, so has the population of the United States; likewise national bank deposits, to say nothing of savings bank deposits and our wealth per capita is certainly making progress in the right direction. In other words, regardless of the unfavorable comments on the installment plan and its effect on the public wealth, we must not lose sight of the fact that statistics go to prove the American public is doing a better job of saving than ever before.

"Let us be a little selfish for a moment and look at this matter from the viewpoint of the Heating and Piping Contractors National Association: For many years the heating industry stood by and watched various other industries put forth every effort to awaken consumers' interest and attract consumers' dollars through the installment plan. Our company realized that there were many home owners who were putting up with the inconvenience of inadequate heating methods because of their inability to gather together at any one time a sufficient amount of money with which to pay for a proper and modern heating installation, and it became quite apparent that if our industry was to preserve its position in the industrial and commercial world, it should take advantage of modern methods of merchandising and provide a plan which would be of service to the heating trade in financing time-payment contracts covering heating equipment sold to responsible owners.

HEATING SYSTEMS REPRESENT CAPITAL ASSETS

"After due consideration is given to all of the factors involved, selling on the installment plan should not be condemned on principle, for the reason that there are many articles of merchandise which, when sold on this plan represent an addition to the purchaser's capital assets—we include heating equipment under this heading and feel that the purchaser is being encouraged to save rather than otherwise.

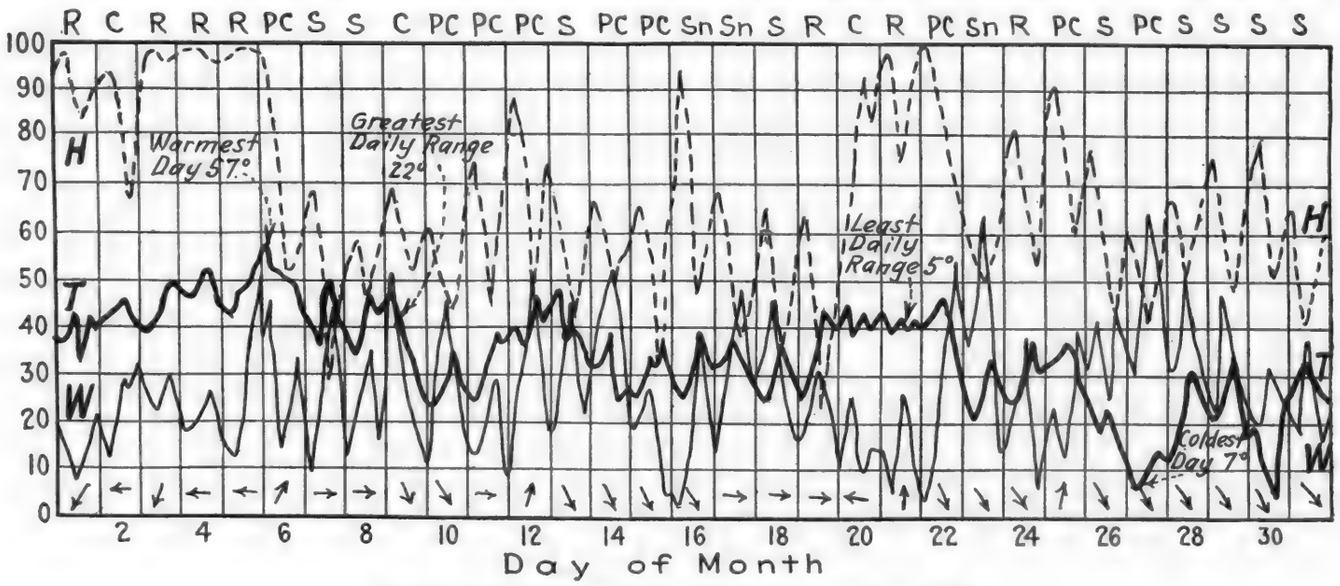
"Furthermore, in any discussion regarding the economic principles underlying the installment plan of merchandising there should be drawn a line of demarcation between what might be called the sale of really useful merchandise not subject to depreciation and articles which might be classed as luxuries, or whose value depreciates to a considerable extent even before payment in full has been made. There is quite a difference between purchasing an investment as against taking on additional expense.

"We feel that it is entirely consistent and in accord with sound business principles to give the American buying public the opportunity to purchase heating equipment which would add to the value of their property and enable them to enjoy its warmth and comfort while they were paying for it out of their income.

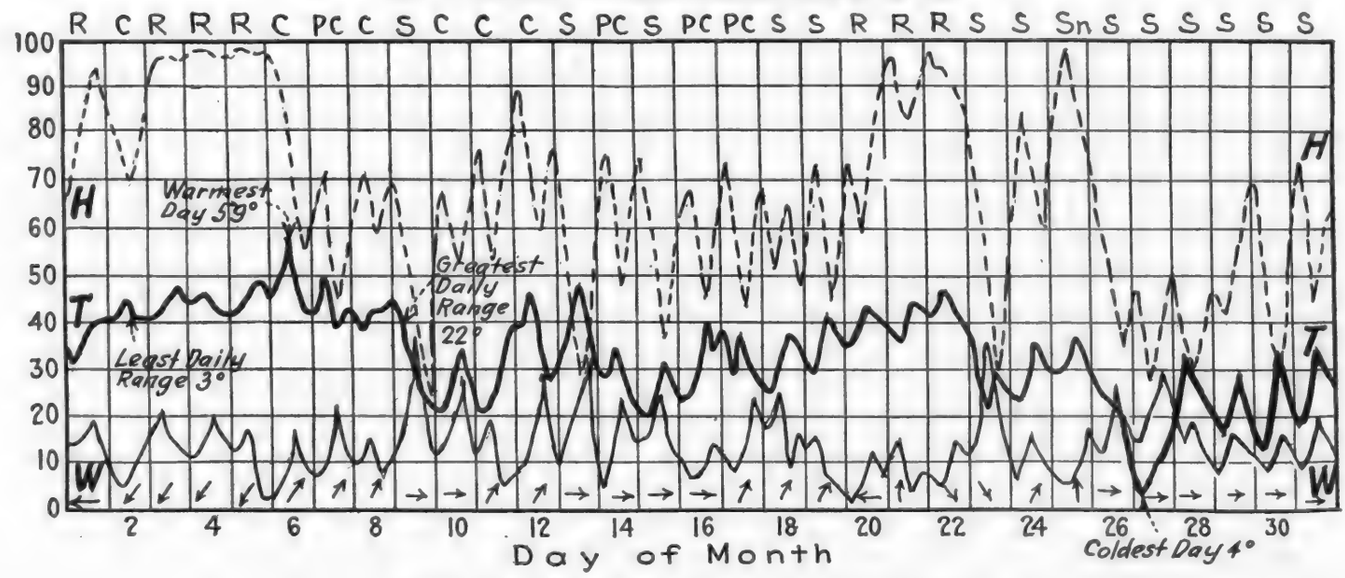
"Our position, therefore, is that notwithstanding the undercurrent of propaganda which has been recently launched against the installment plan method of selling, our company feels that it is justified in promoting this plan for the merchandising of its products, and that the economic foundation of the country will be strengthened rather than otherwise if purchasers on this plan spend their money for improvements that would have an asset value, instead of buying something that becomes a burden through added expense."

The Weather for December, 1925

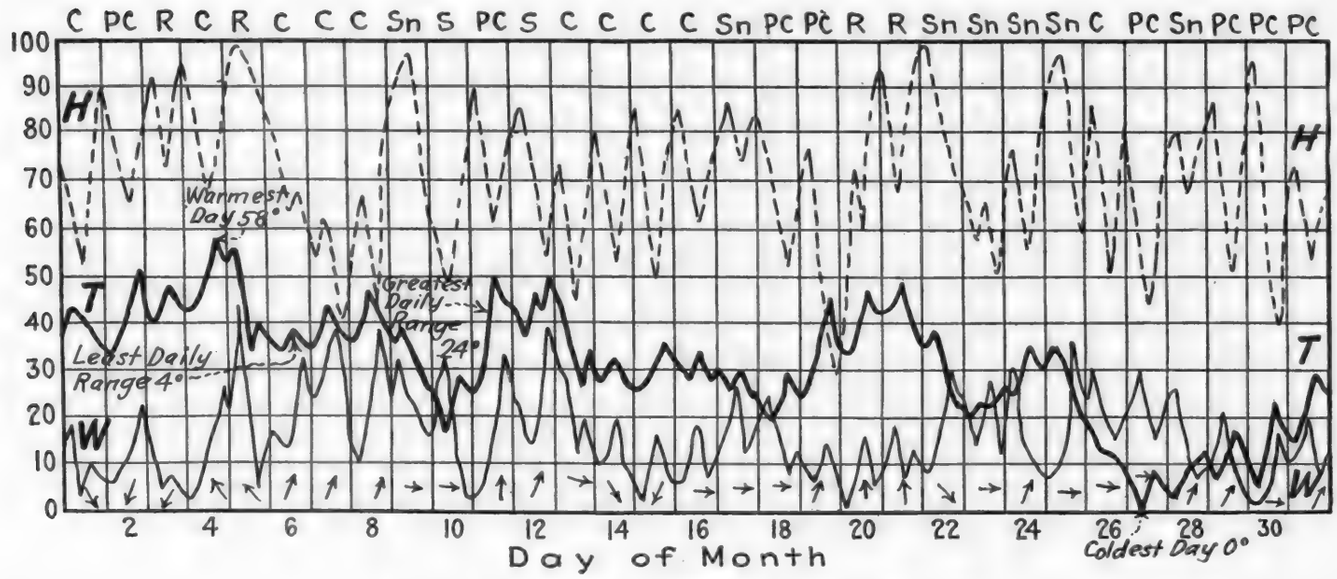
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F.	57	59	58	51	65
Date of highest temperature	6	6	4	4	12
Lowest temperature, deg. F.	7	4	0	—8	—1
Date of lowest temperature	27	27	27	27	27
Greatest daily range, deg. F.	22	22	24	25	27
Date of greatest daily range	9	9	11	5	4
Least daily range, deg. F.	5	3	4	4	5
Date of least daily range	21	2	6	20	16
Mean temperature for month, deg. F.	34.5	33.6	30.8	25.4	32.8
Normal mean temp. for month, deg. F.	35	32.5	34.2	30	34.9
Total precipitation, in.	3.33	5.2	1.4	1.21	1.46
Total snowfall, in.	0.9	0.5	2.9	6.2	0.2
Normal precipitation, this month, in.	3.45	3.41	2.73	2.07	2.23
Total wind movement for month, miles	17079	9158	10372	8156	9576
Average wind velocity, miles per hour	23	12.3	13.9	11.0	12.9
Prevailing direction of wind	N.W.	W.	W.	W.	N.W.
Number of clear days	8	12	2	8	5
Number of partly cloudy days	12	9	10	5	13
Number of cloudy days	11	10	19	18	10
Number of days with precipitation	12	11	12	10	5
Number of days with snow	2	1	7	8	1
Snow on ground at end of month, in.	None	None	Trace	1.3	None



Record of the Weather in New York for December, 1925
(Hourly Observations of the Relative Humidity Plotted on this Chart)



Record of the Weather in Boston for December, 1925


C PC R C R C C C Sn S PC S C C C C Sn PC PC R R Sn Sn Sn Sn C PC Sn PC PC PC
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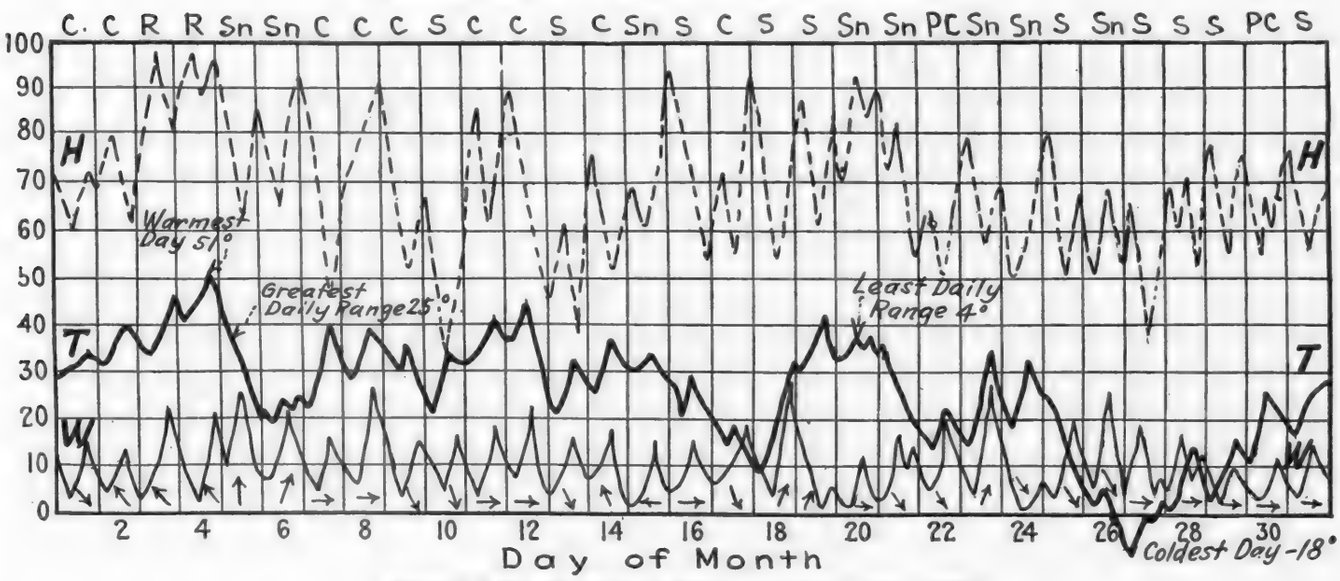
Warmest Day 58°
Greatest Daily Range 24°
Least Daily Range 4°
Coldest Day 0°
Day of Month

Record of the Weather in Pittsburgh for December, 1925


C C R R Sn Sn C C C S C C S C Sn S C S S Sn Sn PC Sn Sn S Sn S S S PC S
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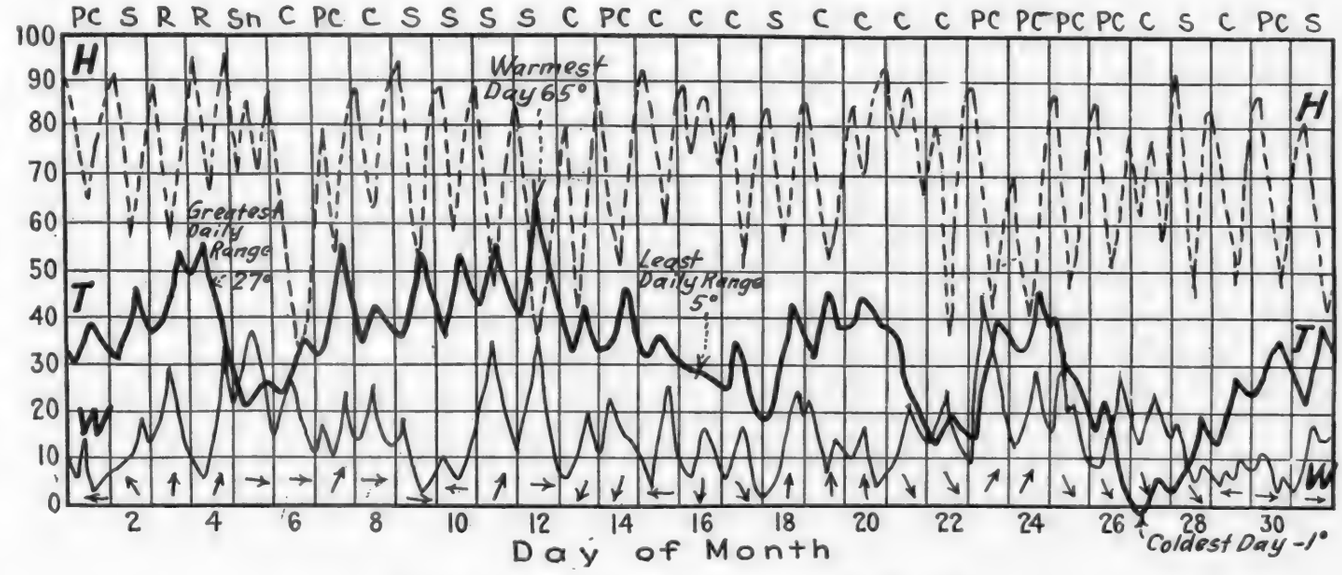
Warmest Day 51°
Greatest Daily Range 25°
Least Daily Range 4°
Coldest Day -18°
Day of Month

Record of the Weather in Chicago for December, 1925


PC S R R Sn C PC C S S S S C PC C C C S C C C C PC PC PC PC C S C PC S
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Warmest Day 65°
Greatest Daily Range 27°
Least Daily Range 5°
Coldest Day -1°
Day of Month

Record of the Weather in St. Louis for December, 1925

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.
Heavy lines indicate temperatures in degrees F. Light lines indicates wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M.
S—Clear, PC—partly cloudy, C—Cloudy, R—rain, Sn—snow. Arrows fly with prevailing directions of wind.

Shall the Oil Dealer Handle Oil Burner Sales?

A vital problem in oil-burner merchandising that has not yet become acute, is here discussed. The conclusion is reached that the oil distributor should "stick to his last." Oil burner sales must be handled by organizations thoroughly steeped in the intricate technique of this new phase of the heating industry.

IN ADDRESSING the Indiana Independent Petroleum Marketer's Association meeting in Indianapolis, on December 9, C. H. Chalmers, president of the American Oil Burner Association, spoke on "The Relationship Between the Oil Burner and Oil Dealer."

In part, Mr. Chalmers said:

The home is not a commercial institution. It is the center of comfort and culture. The home owner makes his money in his business and spends it on his home. The kerosene distillates and gas oils are well adapted to the small burner and the oil business there competes with the better grades and higher priced coals. Even if oil should cost 25% more than coal, the user once converted to oil will not go back to coal. My experience has been that a good burner will sell and stay sold so long as one can buy one pound of suitable oil at the same price as one can buy one and one-half pounds of suitable coal.

BURNER MUST BE CAREFULLY MADE

The burner needs to be an extremely carefully designed and well built apparatus. The distillates and gas oil put on the market should have very definite grades established. The public needs education in the use of oil for domestic heating. It may take as long for the domestic burner to replace hard coal as it took the auto to replace the horse on the public highway. Architects, consulting engineers, heating contractors, burner manufacturers, oil producers, the technical press, and most of all the public must be educated to oil as a source of heat in the home. Co-operation, exchange of ideas, lots of hard work, courtesy to competitors—these things coupled with a realization of the splendid service we can render our fellowmen in breaking the chains that bind them to coal, dust, dirt, and ashes in the home—will in a generation bring respect and honor and profit as just rewards for our contribution to human welfare and happiness.

I am repeatedly told that the domestic oil burner is a luxury. I deny the charge and claim it's an investment. The average American home costs $1000.00 per room, i.e., $5000.00 for a five-room house, $7000.00, for a seven-room house, $12,000.00 or more for a 12-room house and so on. When you burn oil instead of coal you have a nice, clean basement free from ashes and coal dust. The basement can be as clean and neat as the rest of your home. Is such a basement not equal to an extra room in your home and easily worth $1000.00?

Again the other rooms are free from the fine dust of coal and ashes that sift up through the other rooms to injure furniture and carpets.

Another thing, if you will keep track of the time used to care for a coal fire as compared with oil, you will find it like comparing hours with minutes. And besides, with oil, you get the same house temperature whether it's 20° above zero or 20° below outside.

THE PERFECT BURNER "FOR A SONG" HAS NOT ARRIVED

If I could tell you that some one has a burner that will burn any kind of oil —that needs no service—that is very efficient—that is fully automatic—and lastly can be installed for $150.00, including a 1000 gallon tank, you oil dealers would all be happy.

If I told you anything of the kind, I would be a bigger liar than Tom Petter. Tom, you know, was kicked out of hell for lying!

If I could tell you all to go into the oil burner business and that you would all get rich by so doing, I would soon prove myself unworthy of your confidence. In a good many places, oil dealers have taken on burner agencies and in a few cases burner agencies have gone into the oil business.

I think both of these courses are entirely wrong.

"Shoemaker stick to your last" is old advice but it's sound advice in this case.

OIL DEALERS SHOULD NOT SELL OIL BURNERS

The burner business is much better left to those who devote all their time to that part of the work, and the oil furnishing is better left to those who are devoting their entire energy to the sale of oil.

There are tricks in all trades. The burner business involves a lot of detail that you don't expect, and after you are in it you learn many things you did not know before. If you devote enough time and energy to your burner sales and service you won't have much time left for selling oil. In other words, the burner business is a full-sized man's job. Make no mistake about that! If you want the public to consider you eminently competent in your line of work, it seems to me wiser, not to cut too wide a swath, but to go deeper into a thorough knowledge of what one is doing.

OIL SUPPLY FOR DOMESTIC BURNERS A VEXING PROBLEM

I have always advocated two, or at most, three grades of oil for domestic use. Personally, if I were retailing oil for domestic burners I should carry 38°-40° distillate and 32°-36° gas oil, and then study and keep up with developments and add another grade, if I had to do so.

This matter of suitable oil is not nearly as easy as it looks. Most people think of gravity as the sole requirement. This is far from the truth. I have seen 38°-40° distillate in a fruit jar at —20° F. and you could turn the jar upside down and no oil would come out. So you see cold test is important. I've seen 34° gas oil with flash and fire too high to ignite in some very good burners. Then too, some otherwise very good oil smells so bad one can't endure it around the home.

At the present time about all that an oil dealer can do is to get in touch with the burner manufacturer, or his agent, and find out the proper oil for the customer. "Just any old thing" in the way of oil will mean trouble for the oil man.

I think the oil man and burner man should work together to induce the home owner to buy a tank that will hold one-quarter of his yearly requirements. This will work out fine for the burner man, oil man, and the user.

THOSE INTERESTED SHOULD UNITE IN ADVERTISING

I believe "Oil Heat in the Home" should be advertised in a regular manner the year around. This should be done by the burner and oil interests working together. This is being done in Minneapolis, also in Washington, D. C. It was done in Minneapolis last year and again this year.

I understand in some of the large cities oil burner dealers are putting in large takage and supplying their customers with a satisfactory oil. In other parts of the country oil companies are actually manfacturing oil burners and taking care of the oil business in connection with them, of course. You all know that the Standard Oil Company of New York has a subsidiary company manufacturing burners and pushing their sale and of course controlling the oil supplied to those burners. It is interesting to observe that the other branches of the Standard Oil organizations have not, so far as I know, at least, gone into the burner business, and the Standard Oil Company's burner, I understand, is to be marketed generally throughout the United States by a Detroit concern which are not identified with the oil industry. Some things of course might be cited to show that these

industries belong together, but on the whole I think I have brought you very nearly at least the concensus of opinion that prevails at the present time in the vast majority of cases where anything like a careful study of the situation has been made.

The Lucky Scots!

Information received from a British contributor regarding a municipal system of central heating at Dundee, Scotland leads to the exclamation above. The Dundee Corporation was the first municipal authority in the British Isles to experiment with central heating of homes and, in this instance, some 250 houses have been supplied with water heat from a central station attached to the municipal laundry. Another installation at Stirling Park, supplies the heat and hot service water for 268 houses from a boiler house, also in connection with a public laundry. The water for heating is delivered at a temperature of 160° F. The interesting part, from an American point of view, would seem to be the flat rate under which the poor Scot heats his home. Originally, for small houses, this rate was 50c per week, but evidently the high cost of living has increased as much in Scotland as in this country and the house owner is now obliged to pay $1.00 per week or $4.00 per month, for heating a large home. It is understood that these rates furnish heat at about the same cost as would result from the use of the conventional fireplaces, used in the Scottish homes, and the obvious advantages of cleanliness and lack of care and attention, are leading the thrifty Scotch housewives to an enthusiastic reception of central heating.

It is calculated that the efficiency of heating is from 50% to 70% which is, of course, greater than the efficiency attending the use of fireplaces. It is reported that one result of the operation of these municipal plants has been a decided clearing of the atmosphere above the communities in question. It has been found that even the thrifty Scot will waste, where it costs him nothing, and due to the extravagant handling of the water supply where it is on a flat rate, it has been found necessary to introduce meters.

Up-to-Date Ventilation for a Hotel Kitchen

The St. Francis Hotel, one of the largest and best-known hotels on the Pacific Coast, recently built an annex to house its new kitchen, spending approximately $250,000.00 on the entire project. After the new kitchen was complete the old kitchen equipment was entirely removed. Thus the hotel now has one of the finest and most modern kitchens in the United States.

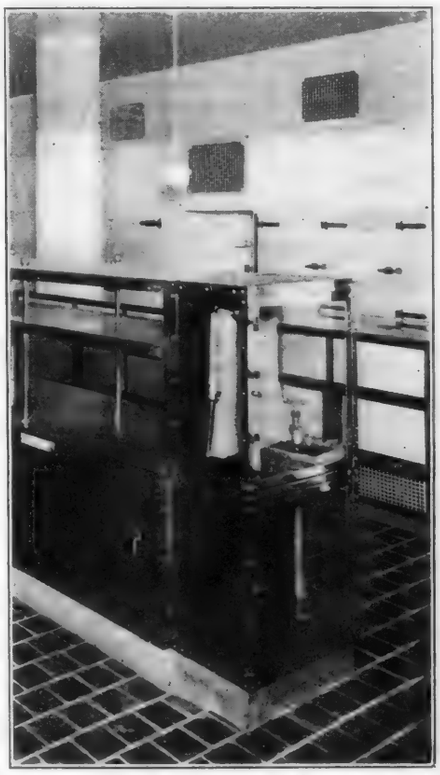
In the designing and construction of the new kitchen special attention was given to the ventilation. The kitchen proper is approximately 160 ft. in length, with a battery of ranges and boilers extending for a distance of 98 ft. on the east side of the room. A concrete hood finished in tile extends or projects 6½ feet over the ranges extending for a distance of about 100 ft.

Kitchen in St. Francis Hotel, San Francisco, Showing Concrete and Tile Hood Over Ranges and Ventilating Grills in Ceiling and in Base of Steam Table

Ventilating openings arranged in this hood and spaced 6 ft. apart and connected with powerful fans are used to exhaust odors and a great deal of the heat in order to provide a comfortable temperature for those workers engaged around the ranges and broilers.

In addition to this a series of approximately 20 grills in the ceiling directly in front of the hood and a series of grills arranged in the wall, on the opposite side of the room, are connected with powerful exhaust fans, giving the entire kitchen freedom from odor and heat.

Filtered air treated with ozone is delivered into the kitchen through a series of grills specially installed in the base of the cooking tables and the pantry tables. By means of this system the air is entirely changed in the kitchen once every ten minutes.



Grill (At Right) in Pantry Table Admitting Fresh Air
Grills in Wall Above are Connected to Exhaust Fans.

Welding Cast-Iron Pipe

Engineers who have had occasion to use cast-iron pipe welded with either cast-iron or bronze will be interested in the results of an investigation made by A. R. Lytle, of the Union Carbide and Carbon Research Laboratories, Inc., Long Island City, N. Y., reported at the recent convention of the International Acetylene Association. In his paper, "Effect of Heat of Bronze Welding on Cast-Iron Pipe," Mr. Lytle arrived at the following important conclusions:

1. Neither cast-iron welding nor bronze-welding has any detrimental effect on the structure of cast-iron pipe.

2. It is possible that with cast-iron very high in phosphorus, the bronze-welding may weaken the structure sufficiently to lead to failure, though this is doubtful.

3. Inasmuch as both welding with cast-iron or with bronze strengthen the base metal at that point, it is more or less natural that line failures in overstressed pipe should occur just outside these altered zones.

4. It may well be that some of the failures occurring in welded gas lines have been the result of surface cracks or defects in the pipe. The influence of these cracks may be emphasized by the welding process.

Legal Decisions

Commission's Order Fixing Increased Steam Heating Rates in Place of Contract Rates Sustained

In proceedings by consumers to review certain orders of the Missouri Public Service Commission granting a raise in rates to the Union Electric Light & Power Company, one of plaintiff's contentions was that the company was not a public service corporation as to furnishing heat.

The company had established a large heating plant connected by steam pipes with adjacent buildings, had made contracts to furnish steam heat to these buildings and a number of other consumers of heat. In accordance with these contracts the company had taken over the private plants of a number of consumers, agreeing to furnish the consumer steam for heating or other purposes, and with electricity for light and power.

The Missouri Supreme Court held, State v. Public Service Commission, 272 S. W. 971, that the company was a public service corporation as to its heating activities, and therefore the commission had jurisdiction to deal with the question of raising its rates during the contract term. The contracts could not influence the service rates as these might be altered by the commission. The rates fixed by the commission were for a year, with a time given in addition to get in reports, and from them to determine the fair rates. The only real question in the case was the propriety of the temporary rates fixed.

DECISION IN A SIMILAR CASE

The court cited another case where it had before it the question of steam heating, State ex. rel. Case v. Public Service Commission, 298 Mo. 303, 249 S. W. 955, where the utility had several different plants from which steam heat was furnished and generated. It appeared there, as it appeared in the present case, that there is too much waste in conducting steam heat for any great distance. In fact, the court said the only economical way of engaging in such a public utility is to have different plants, located in districts wherein there would be demand for the commodity, which was the company's plan.

Another question settled in the case cited was that where there is a combined plant for the production of both electricity and steam heat, there should be a proper allocation of the value of the plant as to the separate uses.

In the Case case, the court required a proper allocation of the instrumentalities used in the production of steam, so that it might be made not only to bear its proportionate part of the expenses, but also its proportionate part of the profits, to insure a reasonable return upon the whole investment for public use.

"The enactment of the Public Service Act," the court said, "marked a new era in the history of public utilities. Its purpose is to require the general public not only to pay rates which will keep public utility plants in proper repair for effective public service, but, further, to insure to the investors a reasonable return upon funds invested. The police power of the State demands as much. We can never have efficient service unless there is a reasonable guarantee of fair returns for capital invested. The woof and warp of our Public Service Commission act bespeaks these terms. The law would be a dead letter without them, and a commission under the law, that would not be the law in the proper spirit, would be breathing into it the flames of ultimate deterioration of public utilities."

The fixing of a rate for a public commodity is held to fall under the police power of the State, and does not therefore violate private contract rights as to rates.

The court will be slow to interfere with the commission when it orders an experiment to be made, in order that equitable rates may be determined. The court's province is to determine whether the order made is unreasonable. As it did not appear that the orders made were unreasonable, judgment of the circuit court setting aside the orders was reversed.

Construction of Contract for Boilers for Heating Plant

A contract for a school building heating plant required two 66 in. x 16 ft. horizontal return tubular boilers built for 125 lbs. working pressure, A.S.M.E. Code, complete with all castings, trimmings and suspension, in accordance with plans and specifications of Seattle school board. The heating contractors contracted to purchase these from plaintiff. The boilers, as furnished, were equipped with pop safety valves designed to operate at 125 lbs. pressure, a pressure too great to operate with safety in connection with other parts of the heating plant.

The plaintiff's attention was called to this and the school district engineer and local inspector refused to permit their operation until they should be equipped with pop safety valves designed to operate at a working pressure not in excess of 20 lbs.

The plaintiff refused to make the necessary change, contending that the boilers as furnished complied with its contract. The heating contractor made the change at a cost of $176.14, and a sum was retained from the contract price to cover this, for which the plaintiff sued. The contest was over the plaintiff's liability to answer for the cost of changing the valves.

The plaintiff contended that, since it furnished valves designed to operate at 125 lbs. working pressure, it was entitled to recover, regardless of the question whether the equipment satisfied the requirements of the school district or the local ordinances. The Washington Supreme Court held, Puget Sound Machinery Depot v. Granston, 237 Pac. 1008, that under the contract the plaintiff had no right to assume that because the boilers were to be built for a working pressure of 125 lbs. they must necessarily be equipped so as to operate at that pressure. It was held to be its duty to inquire as to the nature of this equipment, and conform the equipment to the requirements found to be necessary from the inquiry.

The specifications referred to local ordinances. "Had these been examined," the court said, "it would have been learned that under no circumstances would a boiler exerting 125 lbs. steam pressure be permitted to be used in a school building. An examination of the specifications as a whole, moreover, would have shown that the balance of the heating plant was not designed to withstand a pressure as great as 125 lbs. Seemingly, these matters, even if they do not themselves show what was intended, at least rendered the contract obscure, making it the duty of the appellant (the plaintiff) to inquire as to its meaning of the arbiter appointed in the specifications to determine all disputed questions which would affect the work under the contract. Inquiry would have disclosed the true intent, and, in our opinion, the appellant was at fault in not making it. It must therefore bear the loss caused thereby." Decree for defendant was affirmed.

To Teach Public How to Use Substitute Fuels

As a result of the strike in the anthracite coal fields, the Anthracite Coal Operators have assigned the entire force of its service engineers to instruct not only the retail dealers, but the public generally in the actual burning of substitute fuels in every kind of heater and boiler.

One of the companies to benefit from this service is the American Ice Company which is a large distributor of anthracite coal for domestic use. The Anthracite Operators' engineers suggested that the company sell run-of-mine bituminous coal and offered the services of other engineers to show the company's representatives how to burn it with the least possible annoyance from smoke and dirt.

This plan was carried through to the extent that the ice company held demonstrations in ten of its retail stations for the benefit of the men, including the truck drivers and also the public. The result, it is stated, was the sale of 265 tons of run-of-mine soft coal the first week of the campaign. The company, it is added, is so satisfied that it has arranged to continue the demonstrations until anthracite is again available.

Tieman Humidifier and Dehumidifier

A type of air-conditioning equipment in use in Australia is designed especially to reduce the cost of such apparatus. The system, it is stated, offers advantages in installations comprising a number of small rooms, or in a very large room where local dry or wet conditions are required.

In the Tieman process one wall of the room is entirely taken up by spray shafts and the other side by heating elements. Circulation is induced by the water spray in the spray shafts.

Preliminary experiments, using water sprays for inducing air movement, are reported by A. Lewis, chief mechanical engineer of the Commonwealth Department of Works and Railways. In this case an improvised duct was installed 2½ sq. ft. in area, as shown in Fig. 1. Air movement was measured at varying water pressures, with free shaft and with restricted shafts. The results obtained are plotted in Fig. 2, together with the amount of water used per 1000 cu. ft. of air moved.

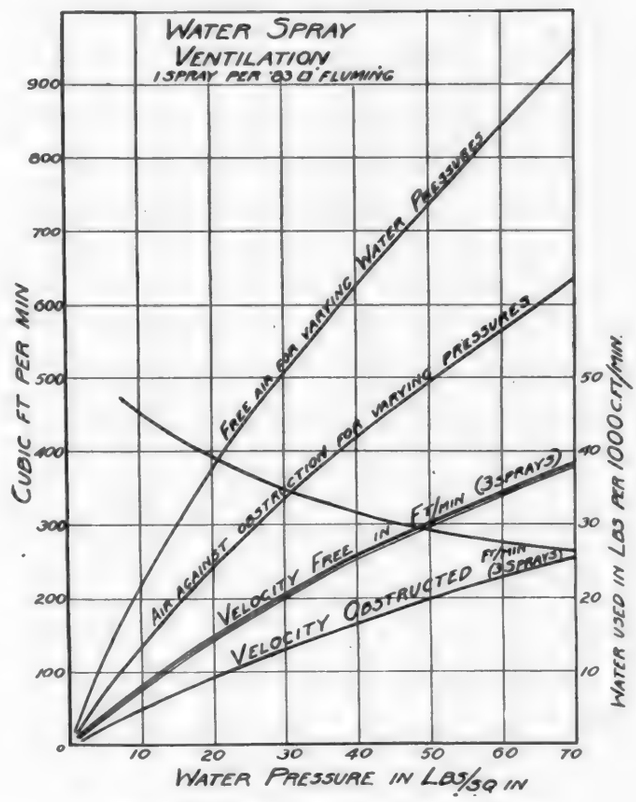

WATER SPRAY VENTILATION
1 SPRAY PER 0.03 O' FLUMING
CUBIC FT PER MIN
WATER USED IN LBS PER 1000 CFT/MIN.
FREE AIR FOR VARYING WATER PRESSURES
AIR AGAINST OBSTRUCTION FOR VARYING PRESSURES
VELOCITY FREE IN FT/MIN (3 SPRAYS)
VELOCITY OBSTRUCTED FT/MIN (3 SPRAYS)
WATER PRESSURE IN LBS/SQ IN

Fig. 2. Test Results of Tieman System

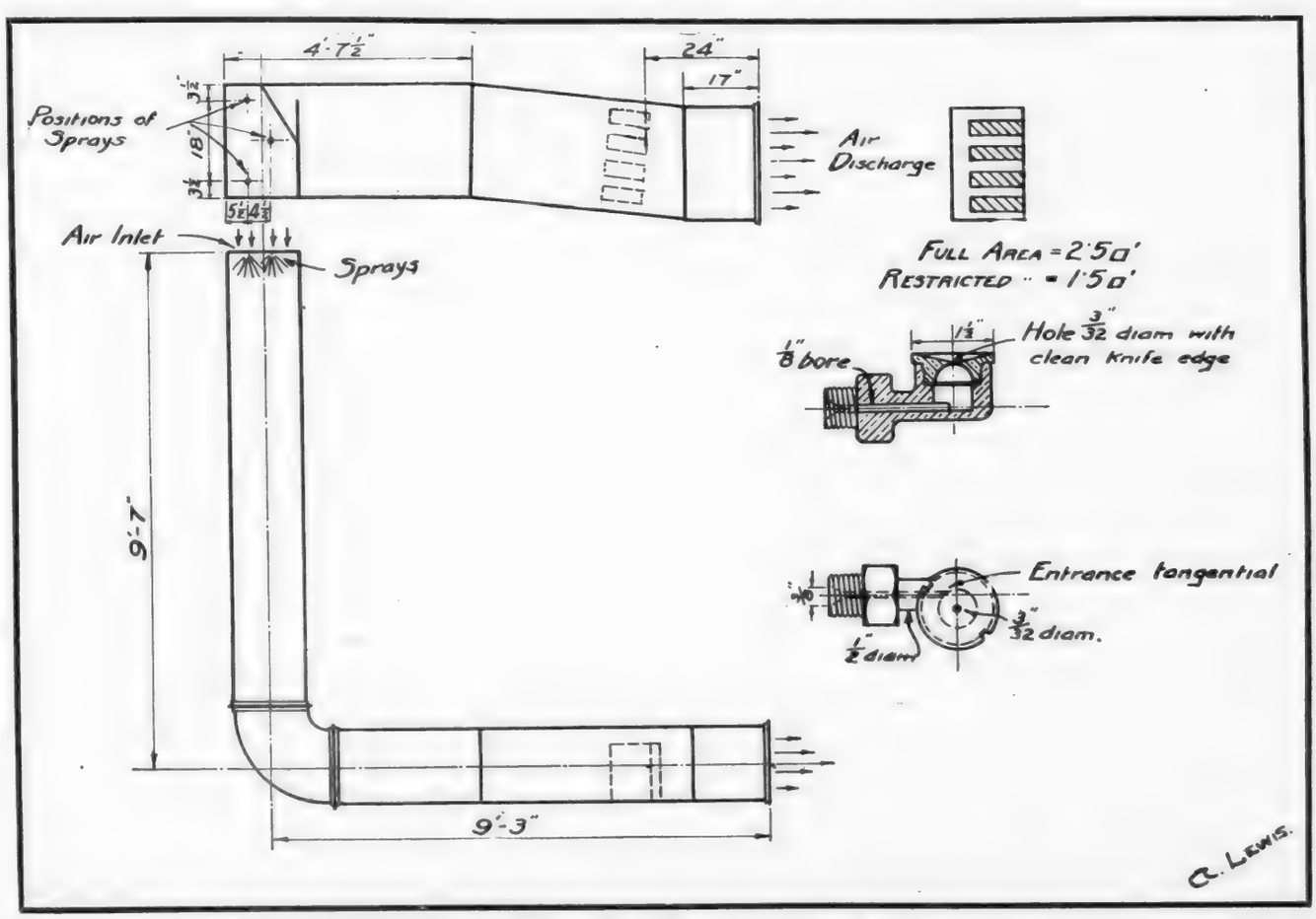


Fig. 1. Arrangement of Tieman Humidifier and Dehumidifier System that was Tested

Correspondence

Making A Water Heating System Circulate With Little Available Head

EDITOR HEATING AND VENTILATING MAGAZINE:

Enclosed you will find a diagram of hot-water pipe-coil job. It seems to be a little difficult for me to list the pipe lines. These will have to be placed under the windows on the north side and southwest corner, as well as a part of the south side between the front of the building and door on the south side.

Kindly send me a diagram showing how this system should be installed to heat to 70° in zero weather, listing also the main and other pipe lines. The building is 30 by 50 ft. in size, 9 ft. 6 in. high to ceiling, with windows 4 ft. 9 in. high set up 3 ft. 6 in. from floor. The boiler room is 2 ft. lower than the main floor of the building.

Red Bank, N. J. J. F. CONWAY

Whenever the motive head for circulation is slight, as in the given problem, it is very important that everything possible within practical limits should be done to increase the circulation. To accomplish this, full advantage should be taken of the cooling effect of the water by leaving uncovered the supply mains and drops to the coils, making these somewhat larger than usual and supplying the coils, where practical to do so, at their far end from the heater as shown in Fig. 1, so as to increase the amount of bare surfaces.

The purpose back of this method will be clearer when it is recalled that it is the difference in temperature between the flow pipe up from the heater and the cooling surfaces beyond that causes circulation, due to the cooler water lowering because of its greater weight. For this reason, the heater and the vertical flow pipe from the heater should be covered, but the surfaces beyond should be left uncovered, as stated above. These bare surfaces being near the ceiling are also of help in killing cold down-drafts from the roof.

Fig. 2 shows an alternative and better method of arranging the system, though more costly, as it increases the number of coils to be made up, as well as the number of valves and connections. However, in this method the vertical spring pieces of the coils are in general extended up about 5 ft. along the windows, thereby putting the heat where it is most needed and increasing the circulation, due to the water cooling and becoming heavier at the higher points established by the spring pieces.

Referring again to Fig. 1, the valved starting pipe shown in the detail will also increase the circulation, that is, when the system is started up from cold. At such times the water is at an even temperature throughout the system so that there is no tendency to circulate, but by opening the valve on the starting pipe circulation throughout the system may be more quickly obtained, due to the local circulation so easily set up in the circuit as formed by this pipe and the flow pipe from the heater. The higher up the connection between these two pipes is made the better will be the results.

Making this system closed rather than open would also increase the circulation, due to the greater temperature drop which is possible through the radiating surfaces. In a system of the closed type, the same temperature and transmission from the pipe coils may be obtained as with steam—300 B.T.U. per square foot of surface as against 200 B.T.U. with the open expansion tank. Certain closed systems do not require the use of a tank; in any event, it is doubtful whether there is room in the building under question for either an open or closed expansion tank. The open tank shown in Fig. 1 should be connected up in the usual way with vent and overflow piping and protected from freezing. The flow pipe should drop, as shown, before being extended to the pipe coils, so as to prevent air from carrying over into the system.

There are a number of other little things that can be done to aid the circulation. For example, the pipe should be carefully reamed out, as few fittings used as possible, and 2 in. pipe used for the coils in order to decrease the resistance (though 1¼-in. pipe would be cheaper). From the standpoint of cheapness, return-bend coils should also have been used, it being possible to easily transport these to the job fully erected as made up in the shop, due to the omission of the spring piece required in coils of the header type. However, return

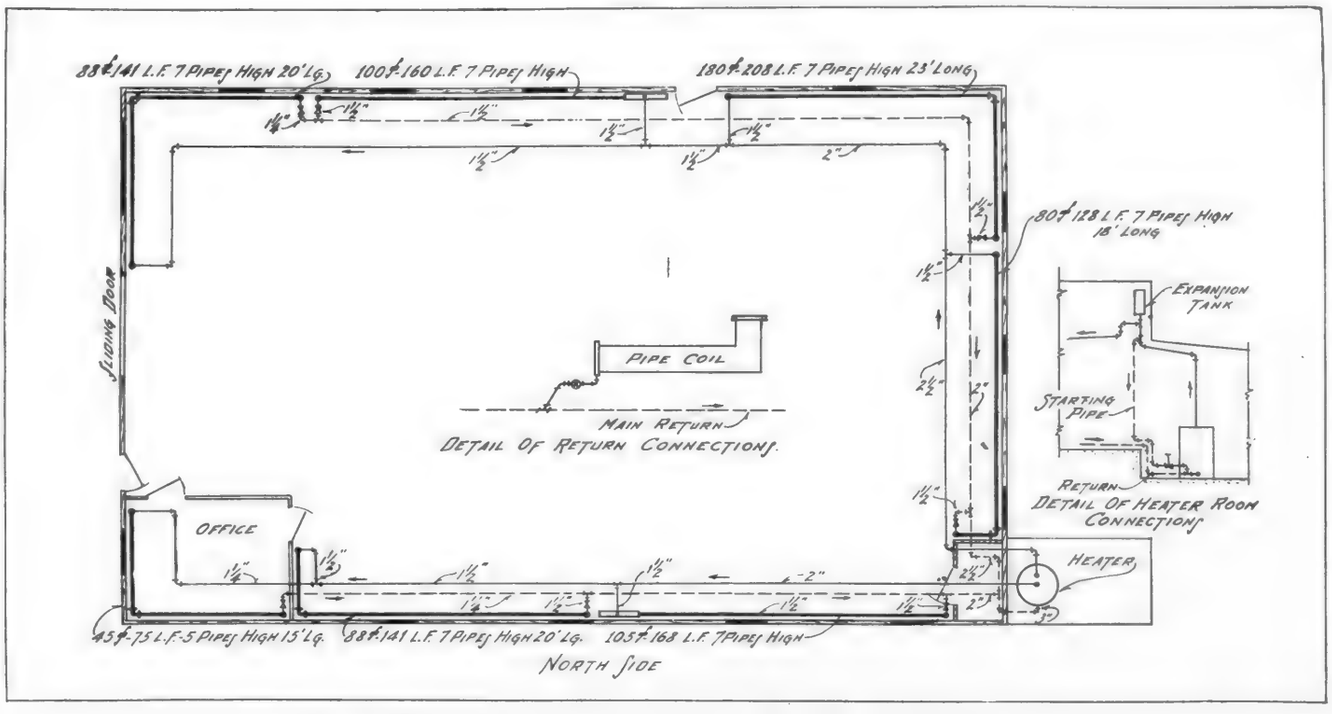

88 ft-141 L.F. 7 Pipes High 20' Lg.
100 ft-160 L.F. 7 Pipes High
180 ft-208 L.F. 7 Pipes High 23' Long
80 ft-128 L.F. 7 Pipes High 15' Long
Sliding Door
Pipe Coil
Main Return
Detail Of Return Connections
Expansion Tank
Starting Pipe
Return
Detail Of Heater Room Connections
Office
Heater
45 ft-75 L.F. 5 Pipes High 15' Lg.
88 ft-141 L.F. 7 Pipes High 20' Lg.
105 ft-168 L.F. 7 Pipes High
North Side

Fig. 1. Securing Maximum Circulation with Little Available Head

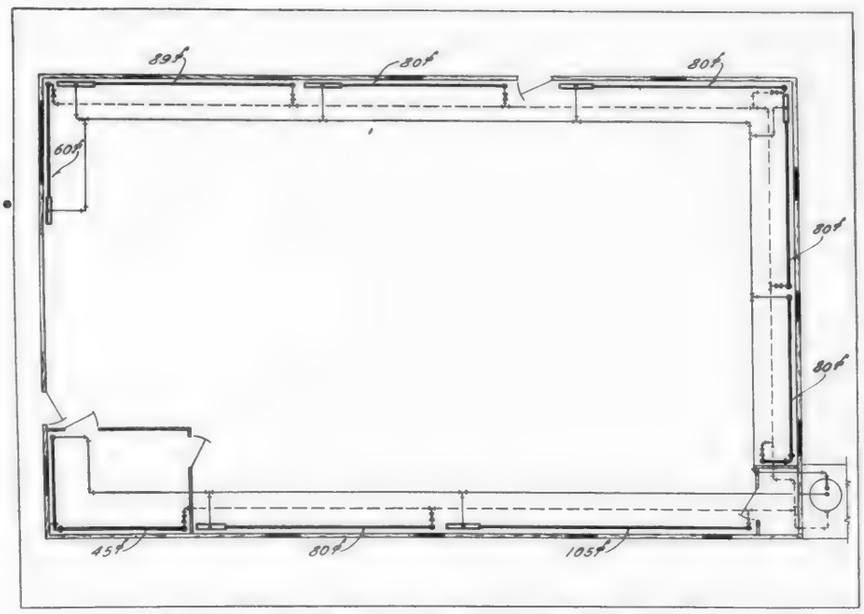


Fig. 2. A Better Method of Securing Circulation Than That Shown in Fig. 1

bend coils offer more resistance and should not be used for this reason in water heating systems of any kind.

A detail in Fig. 1 shows how the return connection should be made where the clearance is but little at the floor. The gate valves shown are turned on their side and should be drilled for 1/16-in. hole to prevent freezing when the coils are shut off. The sketches are diagramatic, but the system should be installed with supply mains overhead feeding down to coils, and with return on wall under the coils, both supply and return mains pitching at least 1 in. in 15 ft. in the direction of flow. No valves are used on the supply connections.

Various methods of overcoming poor circulation in water heating systems may also be found in THE HEATING AND VENTILATING MAGAZINE for November, 1924, and January and April, 1925.

T. W. REYNOLDS

For Longer Life of Smoke Pipes

EDITOR HEATING AND VENTILATING MAGAZINE

Referring to The Heating and Ventilating Magazine for November, page 77 ("For Longer Life of Smoke Pipes"), in Europe generally, and in the British Isles especially, makers of heating boilers have regularly provided smokepipe and ells and other shapes made of cast iron—costing but very little more than the customary sheetmetal smokepipe and fittings used in this country—and lasting interminably.

A definite "call" for cast-iron smokepipe and fittings on the part of the heating contractors in this country would doubtlessly be met by the makers of heating boilers in this country.

Buffalo, N. Y. F. B. H.

Estimating Data For The Sheet-Metal Contractor.

EDITOR HEATING AND VENTILATING MAGAZINE:

In THE HEATING AND VENTILATING MAGAZINE for August, 1925 there is a communication from T. W. Reynolds relative to the cost of sheet-metal work. I am interested in this matter and would like to know how the estimated prices of 25 to 40 cents per pound are arrived at on the basis of the labor charges which he uses.

The shop labor charge used figures 2 cents per pound and the erecting labor charge a little over 5 cents. Adding 33 1/3% would bring the charges up to a little under ten cents and no reasonable charge for material would bring the cost up to the prices named. I am inclined to think that the estimated pound prices are reasonably correct, but there seems to be something the matter with the labor items.

Newark, N. J. JAMES O. G. GIBBONS.

To make this question clearer, the reader is referred to the following extract from the article mentioned:

"In the estimate under consideration, one can start by figuring what the shop can handle in a day. Thus, 500 lbs. of sheet metal can be worked up by one man per day in the shop at a labor cost of $10.00. Next, 350 lbs. of sheet metal can be erected on the job by a man and helper at a total cost of $18.00 per day. After adding 33 1/3% of the labor cost for contractors' profit and overhead it will be found that the total cost in place will run about 35 to 40 cents per pound on jobs costing $500.00 or less, and 25 to 30 cents per pound on jobs where the total cost exceeds this amount."

The above-estimated pound prices are reasonably correct as the correspondent points out, but so are the labor items. Trouble in this case lies in the comparison or the attempt by the correspondent to combine two totally different methods of estimating into one method and then trying to make the two check closely without extending or completing the detail method. One is a general, or rough but quick, method for offhand approximations, the other is a lengthy, but more exact, detail method for use with final and complete figures.

Beyond the labor items mentioned, no one can forecast in an article generalizing on the estimating of sheet-metal work exactly what and how many items will enter into the detailed method of arriving at the total of each job that arises, hence this method was not carried out. The cost of miscellaneous items, such as fans and registers, in number and kind peculiar to each job, were left for the computer, as such costs are more generally known. Whatever the items may be, they are easily figured, once a specific job is given one to work upon. However, for the sake of illustrating the detail method more fully and completely, let us assume such a job.

Take a job containing 5000 lbs. of sheet-metal located in or close to New York City. Such a job, estimated according to the general or pound method, which ranges from 25 to 30 cents per pound, will cost from $1250.00 to $1500.00. This cost will vary according to the job and as judgment, experience or competition dictates, or as the contract includes or omits certain items usually a part of the other trades. For example, registers may or may not be furnished by others.

Now take the detail method and carry it out for comparison of total cost so obtained, with the cost derived by the method above, adding together the costs which follow so as to produce the total cost which, for further comparison may be reduced to the pound charge. Thus, $15.00 for incidentals,—bolts, nuts and sundry items, for one can't buy much with that money, $20.00 for four canvas connections at fans (assuming two fans), $200.00 for labor in handling the fans from sidewalk and erecting in place, an item almost invariably in the sheet-metal contract, $1.00 each for labor installing the registers usually furnished by others, assuming fifty, on a job of this size, and finally $75.00 for cartage, for we have to get this outfit to the job.

Above miscellaneous items of labor cost total $360.00 to which amount must be added the cost of shop labor

$$\frac{5000 \text{ lbs.} \times \$10.00}{500 \text{ lbs.}}$$

and erecting labor

$$\frac{5000 \text{ lbs.} \times \$18.00}{350.00 \text{ lbs.}}$$

figures which, when worked out and added together, bring our total labor cost up to $717.00. Adding in the liability insurance rate on labor of 4% increases this amount to $746.00, our final total cost for labor. Now comes the contractors' profit and overhead of 33 1/3% of the labor cost, which added in makes

the sum of $995.00, then sheet-metal material at 5 cents per pound. This makes the grand total $1245.00 and the estimate is complete.

This is near enough to the general method of 25 and 30 cents per pound, giving sums ranging from $1250 to $1500.00, to be conclusive that the detailed method given in the example is also correct and consistent with the other method; in fact it is, as one might say, suspiciously correct. However, an examination of the figures will show no juggling to prove the case.

It is rarely that an unknown job may be selected such as this, one based on pure assumption, which will check to the last figure the statements made, in this case the figures being closer than most any two methods of costs usually come. In any event, the example points the way and when everything is taken into account on a known job, such as stiffeners, quadrants and similar items, it will be found that the costs originally given are correct and in accord.

In reality, a man and helper can do very much better than 350 lbs. erected per day, but this figure is conservatively used for estimating purposes. On the other hand, present rates, in many cases, would increase the $10.00 shop labor charge to $15.00 and the $18.00 charge for erection to $27.00.

New York. T. W. REYNOLDS.

Quantity of Water and Friction-Head in Water Heating System

EDITOR HEATING AND VENTILATING MAGAZINE:

We are trying to find some printed formula or other information to determine the amount of water and friction head for water heating systems with given radiation. Can you help us out on this? A. L. D.

Cast-iron radiators have an internal volume of approximately 1½ pints per square foot of rating, and steel radiators and steel pipe hold about 1 pint per square foot of rating. The internal volume of the radiation is generally assumed to be about 50% of the total volume in the system.

Data sheets Nos. 133 P-Q-R, published by THE HEATING AND VENTILATING MAGAZINE, cover the question of friction head. Necessary data may also be obtained by reference to such books as "Heating and Ventilation," Vol. 1, by Harding and Willard; "Central Station Heating," by Gifford, A. S. H. & V. E. Guide, 1925, and "Power, Heating and Ventilation," by Hubbard. Meier's "Mechanics of Heating and Ventilating" takes up the matter of pipe sizes very thoroughly, taking into account all variables affecting the problem, and while the method given is complex and not readily acquired, once it is mastered, the use of the charts as given therein will be found to take but very little time, with the further advantage that the results will be the most accurate obtainable. T. W. REYNOLDS.

Comparative Heat Losses from Buildings With and Without Attic Space

EDITOR HEATING AND VENTILATING MAGAZINE:

I am enclosing a sketch of an imaginary building. If you will determine the total heat loss for such a structure, assuming 70° difference between inside and outside temperature, and also determine heat loss with ceiling omitted and room open to roof joists, I will appreciate your courtesy.

I am asking this assistance as a check on my method of figuring such a problem. The source of heat is not considered, as it is apart from the specific information I am seeking.

Fort Wayne, Ind. B. J. M.

Dividing the total B.T.U in the calculations given at the conclusion of this answer by 250 B.T.U., the transmission per square foot of radiation, gives 346 sq. ft. as the required direct cast-iron radiation if the ceiling is omitted and 300 sq. ft. with the air space included, making a saving in the latter case of approximately 13%.

As customary in computations of this nature, one air change was assumed, 10% added for east and west exposures and 15% for northern exposure, doors taken as glass and the earth under the floor estimated at 50° F. The air space was assumed at 45°, as usually done, but this may be figured as follows, assuming the walls above the ceiling to be brick without plaster and adding for exposures as before.

Ceiling = 1012 × 0.62 = 627 total B.T.U. lost from room to air space per degree of temperature difference.

Roof = 1012 × 0.3 ..... 303.60
Wall (east and west) = (138 × 0.31) + 10% 47.06
Wall (north) = (66 × 0.31) + 15% 23.53

374 Total B.T.U. lost from air space to outside per degree of temperature difference, then

X — 0° = temperature difference between the air space and the air outside.

70° — X = temperature difference between the room and the air space.

Equating the two, 374 X = 627 (70 — X)

374 X = 43890 — 627 X

X = 117 — 1.68 X

2.68 X = 117

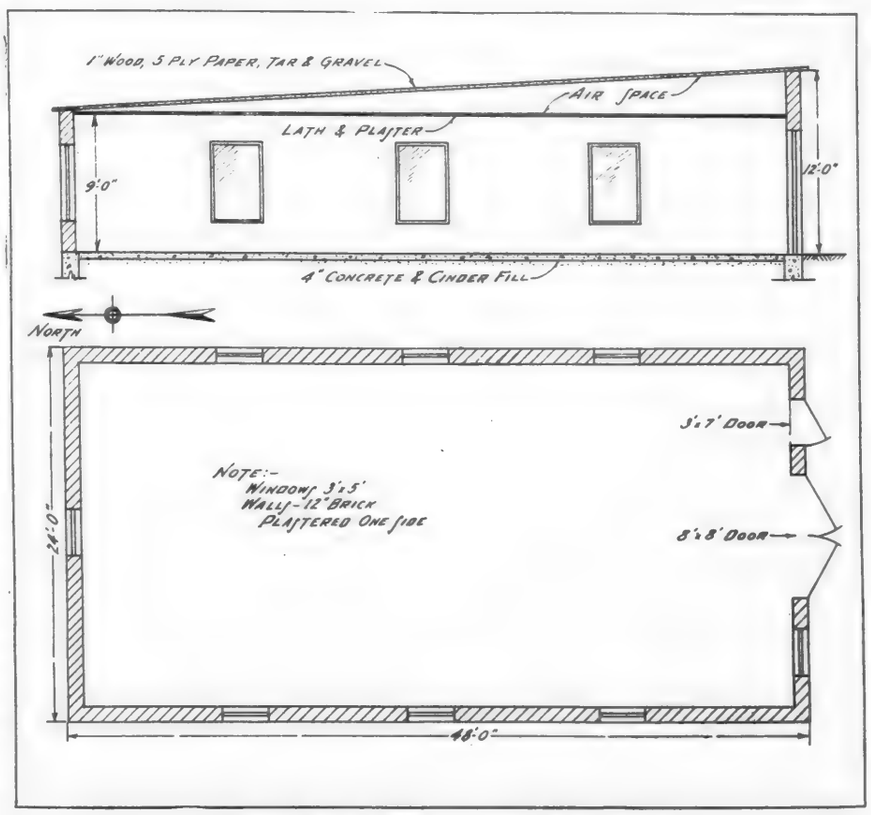
X = 44°, the temperature of the air space, which is near enough for all practical purposes to the temperature assumed.

WITH ROOM OPEN TO ROOF JOISTS

Cubic Contents = 22 × 46 × 10.5 X 0.018 X 70°	13495
North Wall = (164 × 0.33 × 70°) + 15%	4241
South Wall = 183 × 0.33 × 70°	4227
East and West Walls = (876 × 0.33 × 70°) + 10%	22260
Glass (north) = (100 × 1.00 × 70°) + 15%	8050
Glass (south) = 15 × 1.00 × 70°	1050
Glass (east and west) = (90 × 1.00 × 70°) + 10%	6930
Roof = 1012 × 0.3 × 70°	20240
Floor = 1012 × 0.3 × 20°	6072
Total B.T.U	86565

WITH AIR SPACE UNDER ROOF

Cubic Contents = 22 × 46 × 9 × 0.018 × 70°	11567
North Wall = (98 × 0.33 × 70°) + 15%	2604
East and West Walls = (738 × 0.33 × 70° + 10%	18753
Ceiling = 1012 × 0.62 × 25°	15686
Glass, South Wall and Floor as above—Total	26329
Total B.T.U.	74939



How Attic Space Decreases Heat Losses

New Madison Square Garden Eighth Avenue 49th and 50th Streets New York

Where the "Own-Your-Home" Show and First National Heating and Ventilating Exposition Will Be Held.

Heating and Ventilating Exhibits at the Eighth "Own-Your-Home" Exposition

While the final roster of exhibitors at the eighth annual "Own-Your-Home" Exposition, to be held in New York and Chicago, has not been made up, the list of manufacturers with whom contracts have been signed includes representatives of every phase of the industry.

In the new Madison Square Garden, New York, from February 20 to 27, many of the exhibits will show equipment in actual operation, and particularly in the section devoted to domestic oil burners there will be unusual interest, as every exhibitor is planning to show his burner in operation in a typical boiler. In every instance the burner is one that is "listed" by the Underwriters, and approved by the Board of Standards and Appeals of New York, insuring only high-class burners.

The Armstrong Cork and Insulation Company, exhibiting for the first time, will show a cross-section of a house, with the insulation exposed so that the public will be able to see exactly what it is, how it should be applied, and the saving and comfort it produces. Wood Conversion and other types of insulation will be displayed.

The Consolidated Gas Company, will exhibit a new type of gas boiler for domestic heating, and there are more than a dozen exhibits of well-known ranges listed.

The New York exhibitors include The Aetna Oil Burner, Inc.; Armstrong Cork and Insulation Co.; Artcraft Radiator Enclosure Co.; Automatic Safety Appliance Corp.; Automatic Oil Burner Corp.; Baker Oil Burner Corp., Beckwith Co.; Consolidated Gas Co.; Cornell Utilities Co.; DeFreiras & Geiger, Inc.; Eastern Gas Appliance Co.; Ever-Hot Heater Sales Co.; the Floyd-Wells Co.; General Gas Light Co.; Kleen-Heet Atlantic Distributing Co.; Kompak Co.; May Oil Burner Corp. Minneapolis Heat Regulator Co.; Queensborough Gas & Electric Appliance Co.; Reliable Stove Co.; Roberts & Mander Stove Co.; A. B. Stove Co.; Standard Gas Equipment Corp.; Sterling Range & Furnace Co.; the Thatcher Co.; Tinnerman Stove & Range Co.; Time-O-Stat Corp.; Earl K. Williams; Herbert E. Williams, Jr. Co.; Wood Conversion Co.

The Chicago Sixth Annual "Own-Your-Home" Exposition will be held at the Coliseum from March 27 to April 3, under the auspices of the Chicago Real Estate Board and will include the same kind of educational displays in a large section set aside for heating and ventilating exhibits.

The Chicago exhibitors in the heating division include:

Armstrong Cork & Insulation Co.; Cook Electric Co.; Cribben & Sexton Co.; Geo. M. Clark & Co.; Chicago Master Steam Fitters Association, Crane Co.; Chicago Coal Merchants Association, Evenheat Manufacturing Co.; Ever-Hot Heater Sales Co.; Fahey Oil Heating Co.; General Oil Burner Corporation, General Appliance Sales Co.; Hannaford & Co.; Holland Furnace Co.; Home Radiator Cabinet Co.; Michigan Stove Co.; Minneapolis Heat Regulator Co.; Majestic Company, Peoples Gas Light & Coke Co.; Round Oak Heating Co.; Rayfield Manufacturing Co.; Radiator Cabinet Co.; Sunbeam Heating Co.; Universal Gypsum Co.; Wolff Range Boiler Co.; Wood Conversion Co.; Wayne Tank & Pump Co.; Weil McLain Co.

Heating and Ventilating Research Service

A research and special engineering service in heating and ventilating and allied industries is announced by Robinson V. Frost, C. E., at 828 West Marshall St., Norristown, Pa. Mr. Frost is a member of the A. S. H. & V. E. and an associate member of the A. S. M. E. His newly-established service will offer facilities for the laboratory testing of boilers and radiators for capacity and efficiency and for the preparation of technical data and manuscripts for catalogues and advertising literature. This service is especially designed to furnish to manufacturers and engineering organizations a competent and unbiased research service.

Preparations Almost Complete for National Heating and Ventilating Show

Rapid progress in the preparations for the First National Heating and Ventilating Exposition in Madison Square Garden, New York, March 17-23, is announced by the National Exposition Company, which is managing the show. In addition to the list of exhibitors published in last month's issue, a number of others have engaged spaces and the success of the exposition is now assured.

At a meeting of the Advisory Committee of the exposition, held at the McAlpin Hotel January 12, it was decided to form a special committee under whose auspices the details of the exposition will be planned. This committee has been organized under the name of the Allied Heating and Ventilating Exhibitors' Association. It is planned to supplement the exposition itself with lectures and symposiums dealing with the growth of the industry and its present place in the industrial world.

School Building Programs for 1925-1926

Summaries of school building activities in 197 cities for 1925-1926, compiled by the *American School Board Journal*, show that the shortage which many thought would have been met before now, continues to the present hour, especially in large communities. The figures indicate that the year 1926 will be the banner year in the field of schoolhouse construction.

In the reports published by the *American School Board Journal*, data are given for representative cities in practically all of the States and they make an impressive showing. To meet the requirements the school bond sales for 1925, based upon the first eleven months of the year, will reach the total of $391,000,000, or 26% higher than they were in 1924.

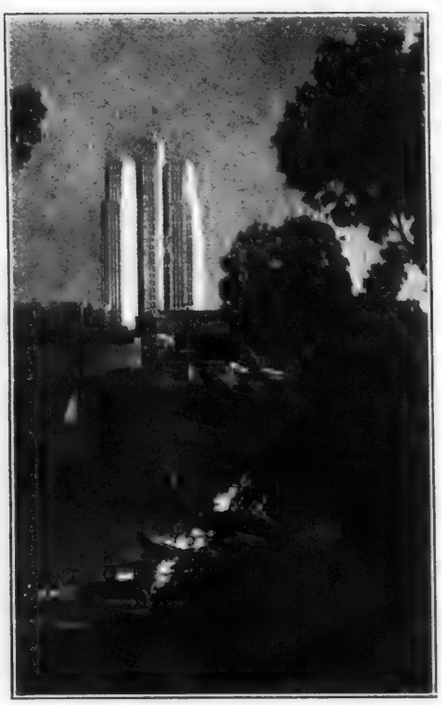
It is usually understood that the bonds issued in any one year are, in the main, expended during the following year. To be sure, some of the smaller projects

may be realized during the same year that the bonds are issued, more especially if the issue is made during the first half of the year. On the other hand, bond issues may cover a program that is not completed in less than three or five years. But the bulk of the bond issues for any given year are usually expended during the succeeding year.

Under these conditions, the conclusion is inevitable that the school building operations for 1926 will be the highest in the history of the country.

Parking Spaces in Building Basements

In San Franciso the parking problem for automobiles has been solved in one case by devoting a portion of the building basement for this purpose. The building is that of the Pacific Telephone & Telegraph Company. In addition, a modern turntable facilitates access and parking for the large number of machines stored in the space during the day.



Pacific Telephone & Telegraph Building, San Francisco, as Seen From the Bay

This development brings up the question of the ventilation of such quarters and is likely to provide another line of activity for the ventilating industry.

San Franciso's new Telephone Building, which is an imposing structure of 26 stories, has been described as "a complete surprise to the architectural profession and a positive delight to the public at large. Its majestic grandeur as seen through the mists of the morning from the water, or in the evening glow from the hills of the Mission or in the mystic glory of night illumination, will excite the imagination of millions as one more triumph in the only form of conquest really worth celebrating the mastery of Mind over Matter."

Certification of Unit Heater Performance Announced at York Sales Conference

A new departure in unit heater practice was inaugurated when the York Heating and Ventilating Corporation held its second annual sales conference in Philadelphia, January 18. The announcement was made that every unit sold would be certified, personally, by the president of the corporation, "to deliver an output equal to or greater than" the ratings published in the York data book.

The data published by the corporation on which ratings will be based, were compiled from tests made on heaters selected at random from standard production, the method of test being that adopted by the National Unit Heater Manufacturers' Association. The York data book, just published, contains complete technical information on all sizes and types of York unit heaters, details of construction, tables of performance, and pertinent data on the practice of unit heatings.

The conference opened with a visit to the York plant at Bridgeport, Pa., where demonstations of various types of unit heaters were made, using smoke bombs to determine the abilities of the heaters to distribute heated air. An interested group formed around the device where the completed shafts with bearings 7 ft. apart are dynamically balanced, and the almost perfect results obtained were demonstrated by standing lead pencils on end on the extreme end of the motor bracket, with the motor at full speed. Some of the more critical, with new coins, found it possible to stand them on edge on the bracket.

After a lunch at the Manufacturers' Club, the conference took the form of a demonstration of unit heater sales, developed by D. E. French, assistant to the president. In this was shown the method of securing valuable "leads," of making the proper approach, and of presenting the facts of unit heating.

In outlining the growth of York business during the past year, Mr. Lewis expressed his appreciation of the efforts of the sales force in almost doubling the total volume of 1924. The unit heater business, he stated, had been nearly 900% greater. Bonus checks were handed to G. W. F. Myers, of the Philadelphia office, for the greatest volume of business over his quota, 170%. The Pittsburg branch was a close second, less than 1% behind. Cleveland, New York and R. S. Arnold, of the home office, also received bonus checks for exceeding their quotas.

The principal speaker, following the dinner, served at the club, was J. J. Pocock, sales manager of the Philadelphia branch of Delco-Light Co. Mr. Pocock spoke on the efficacy of prearranged sales talks, and outlined the pratice of his organization in drilling its salesmen.

In addition to a score of local associates of the York corporation, there were present, from the branch offices: Harry F. Coleman, Providence, H. Berkley Hedges, J. W. Millard, E. A. Hamilton, D. F. Sickenberger and B. J. Halm, New York; J. Lester Barr, Baltimore; J. B. Marshall, and J. H. Weir, Wilkes-Barre; W. L. Byrne, Pittsburgh; W. D. Graham, Cleveland; George O. Jackson, Indianapolis; J. S. Kilner, Detroit; A. U. Wethertherbee, Chicago; I. K. Cozzens, St. Louis, B. B. Wolfe, Columbus, and Howard Evans, Lexington, Ky.

An English Tempest in a Teapot

English heating and ventilating circles are aroused over some sensational remarks made by Dr. Bennett, at a recent conference of the British Smoke Abatement League, in which he declared that centrally-heated rooms, so-called, create the need for the office cup of tea. A rejoinder has been issued by the (British) Institution of Heating and Ventilating Engineers suggesting that such views tend to injure a comparatively young, but growing, industry. Dr. Bennett's suggestions, it is declared, are ridiculous since the apparent need of the Englishman's afternoon cup of tea obtains throughout the year in most offices in Britain, whether they are centrally heated or not.

If it is true that stenographers and clerks in public offices suffer from the dry atmosphere of such rooms and the absence of ventilation, the medical officer, states the institution, has failed in his duty by not demanding that proper ventilation be provided. He, like many others, appears to think that central heating is some mysterious form of ventilation or is synonymous with the absence of ventilation.

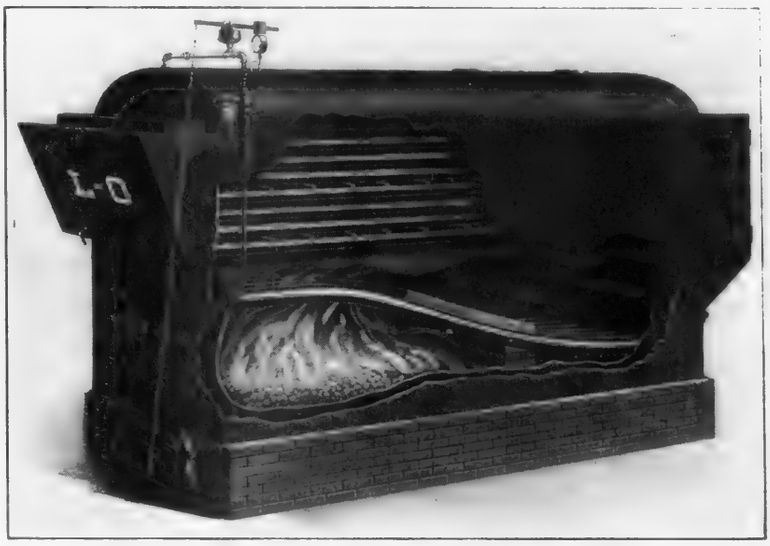
If Dr. Bennett will take the trouble, continues the statement of the institution, to seek the advice of those competent to express opinions on the subject, he will find that his whole argument is without a basis of fundamental facts and principles.

The fact apparently has been overlooked in the discussion in question that the absence of ventilation, and not central heating, is responsible for the condition Dr. Bennett condemns. The heating engineers of Britain, concludes the statement, are keenly interested in smoke abatement and it is the advantages possessed by central heating in this connection that has been responsible for its increasing use in place of open fires.

New Apparatus and Appliances

New Heating Boiler Reflects Locomotive Practice

An interesting new domestic boiler has been placed on the market by the Lebanon Boiler Works, Lebanon, Pa., in which the most advanced locomotive boiler design is strongly reflected. The boiler is of the fire-box type, constructed



Partial Section of New L-O Boiler

in full accordance with the A. S. M. E. code and is furnished either welded or riveted. The fire-tubes are open at both ends, and the products of combustion pass the entire length of them from the rear to the front smoke box. A combustion arch of refractory brick, is supported on the lowest tier of circulating tubes, and this arch, being incandescent at conventional loads, insures thorough combustion of fuels rich in volatile gases.

To determine the operating characteristics of the L-O low pressure steam heating boiler, a serious of twelve tests was made in the Department of Mechancal Engineering of Pennsylvania State College, State College, Pa. In these tests the boiler was fired with both coal and oil and was operated under loads ranging from 33% to 234% of rating. An interesting point brought out was that at a load practically two and one half times the rating of the boiler, the moisture in the steam was only 0.33% with natural draft. The draft drop in the boiler ranged from 0.08 to 0.25 in. of water within the range tested. This low pressure drop indicates highly efficient results with poor chimneys. In all cases, when burning soft coal the smoke density was well within the maximum permitted by leading city ordinances.

A series of tests with both low-pressure and high-pressure oil burners was also run, and this series was interesting particularly because of the characteristics of the efficiency curves developed, and their comparison with the efficiency curves, when burning soft coal. When burning oil, the test started with a load of 25% of the boiler rating and from that point to a load of 175% of rating, the efficiency curve is practically a straight line with an almost fixed value of 81%. At approximately twice the rated load, the efficiency curve begins to droop. When burning soft coal the highest efficiency recorded was 78%, which was secured at about 50% overload.

The completeness of combustion was indicated by the fact that the CO_2 content of the flue gas was 10.8% at half load, and in excess of 14% at the higher loads up to 234% of the rated load. This, of course, refers to flue gas analysis when burning oil fuel. When burning semi-bituminous run-of-mine coal, the CO_2 content varies between 10.2% and 14.19%. L-O boilers are made in 18 sizes for low-pressure work, with capacities ranging from 3000 to 30,000 sq. ft. of steam. Power boilers, of the same dimensions as the steam heating boilers are also built for pressures up to 160 lbs. per sq. in.

New Condensation Pump Operates on all Pressures from Maximum to Zero

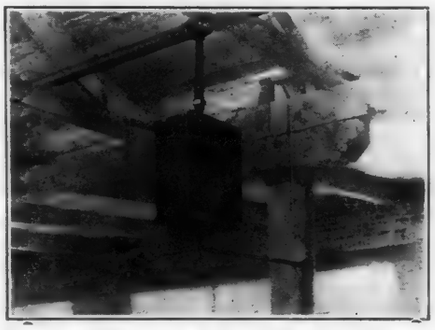
A new condensation pump, designed for use where there is a wide variation in the steam pressure carried, has been developed by the American Steam Pump Co., Battle Creek, Mich. In many heating plants, a comparatively high steam pressure is carried during the day, which is sufficient to operate a steam pump, but at night the steam pressure is allowed to drop approximately to zero. Under this condition the condensation is not returned to the boiler and, consequently, the receiver tank and the return lines are flooded and considerable time is required in the morning before they can be cleared. This new unit is comprised of a conventional steam pump, connected with an electric motor-driven centrifugual pump, by a series of controlled switches located in a receiver tank. The automatic control is actuated by two float switches, located at different levels. The lower float, operating the steam pump and the upper float controlling the motor-driven centrifugal pump. When the steam pump ceases to operate the water rises in the tank and throws in the electric pump. Under normal working conditions this pump functions under any steam pressure from maximum down to about 15 lbs. where the steam pump stops operating, due to lack of steam pressure. At this point, through the action of the switches, the centrifugal pump is cut in and operates until the minumum required steam pressure is again attained. These units are made in nine sizes, having abilities to handle returns from 3000 sq. ft. to 75000 sq. ft. of direct radiation. Full information regarding this unit is contained in the company's Bulletin No. 58.

New Design of Unit Heater

New ideas in the design of a unit heater to provide maximum heat transfer with minimum weight, are embodied in the new Modine unit heater, which is announced by the Modine Mfg. Co., Racine, Wis. This company, for fifteen years, has been engaged in the manufacture of heat-transfer devices.

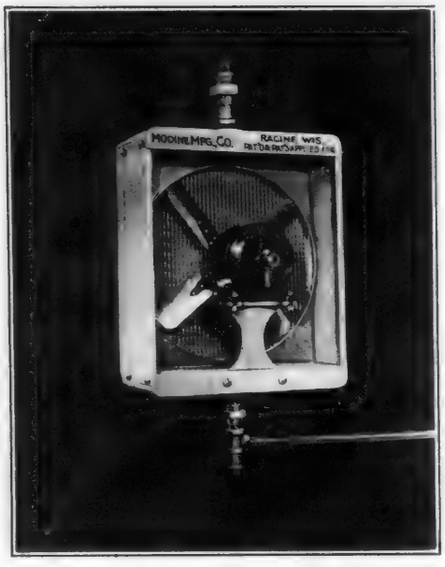
The Modine unit heater consists of three major parts, the radiator assembly, the manifold and frame assembly, and the motor and fan assembly. Copper and special materials are used in the construction of the indirect radiator which is of patented design, providing for expansion and contraction and made impervious to leaks, rust or corrosion.

One of the most notable features of the Modine unit heater is its light weight of only 125 lbs. Brackets, braces and structural work are entirely eliminated,



Typical Installation of Modine Unit Heater

the heater being suspended from the steam line by means of a length of pipe and a union. The complete unit can be turned on the union connections for di-



Close-Up of the Modine Unit Heater, Showing Fan and Coil

rection of air flow towards any point. If desired, adjustable deflectors may be added to control the downward angle of heat discharge.

The heater, which is made in a single size, is rated at 165,000 B. T. U. per hour with 5-lb. steam pressure and a room temperature of 60° F.

Approximately 2000 cu. ft. of air pass through the heater per minute.

The ease with which Modine units can be added to an original installation makes them particularly adaptable as supplementary equipment to inadequate heating systems. A catalog just issued by the company (Bulletin A) is devoted to the construction and use of Modine unit heaters, accompanied by capacity tables and dimensions, together with views of installations in various types of buildings.

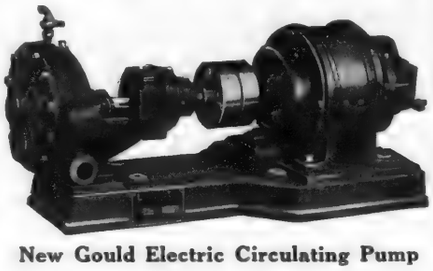
Bryant Nipple-Turning and Threading Machines

A nipple-turning machine which will turn out boiler nipples and similar work from 2 to 9 in. in diameter and from ½ to 6 in. in length, and an automatic machine for threading nipples, tubing, etc., are interesting products of O. Bryant Sons & Co., 366 Ontario St., Buffalo, N. Y. For the nipple-turning machine the work must be hollow, since it is held on an arbor that is inserted in one end and expanded against the wall of the work. The material may be turned to any desired form, such as a taper, double taper, concave or convex.

With the nipple-threading machine right or left-hand straight threads and pipe threads can be cut simultaneously on both ends of the work, and the threads can be continued until they almost meet. Pipe up to the 3-in. size and up to 9 in. long can be handled, while threads can be cut on the ends to a length of 2 in. The machine is intended primarily for use in radiator manufacturing plants, but is applicable to other fields.

Goulds Circulating Pump

A new electric motor-driven pump has been placed upon the market by Goulds Manufacturing Co., Seneca Falls, N. Y., designed to operate against a relatively high head, and for comparatively low capacities. The pump is designed in response to a demand for circulating ice water in hotels, apartment houses and clubs. It operates with a pressure of 50 lbs. on the suction, which makes it especially adaptable for a house booster pump.

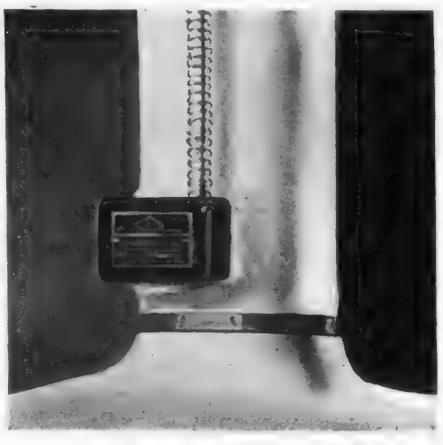


New Gould Electric Circulating Pump

The pump is mounted on a cast-iron bedplate with pin-and-buffer type flexible coupling, direct-connected to a 1 H. P. electric motor of standard make, operating at 1750 R. P. M. The pump is two-stage, single side suction, open impeller type. It has capacities ranging from 10 to 30 gal. per minute when operating against net heads of from 40 to 70 ft. It is tapped for 1½ in. pipe on the suction side and 1 in. pipe on the discharge side.

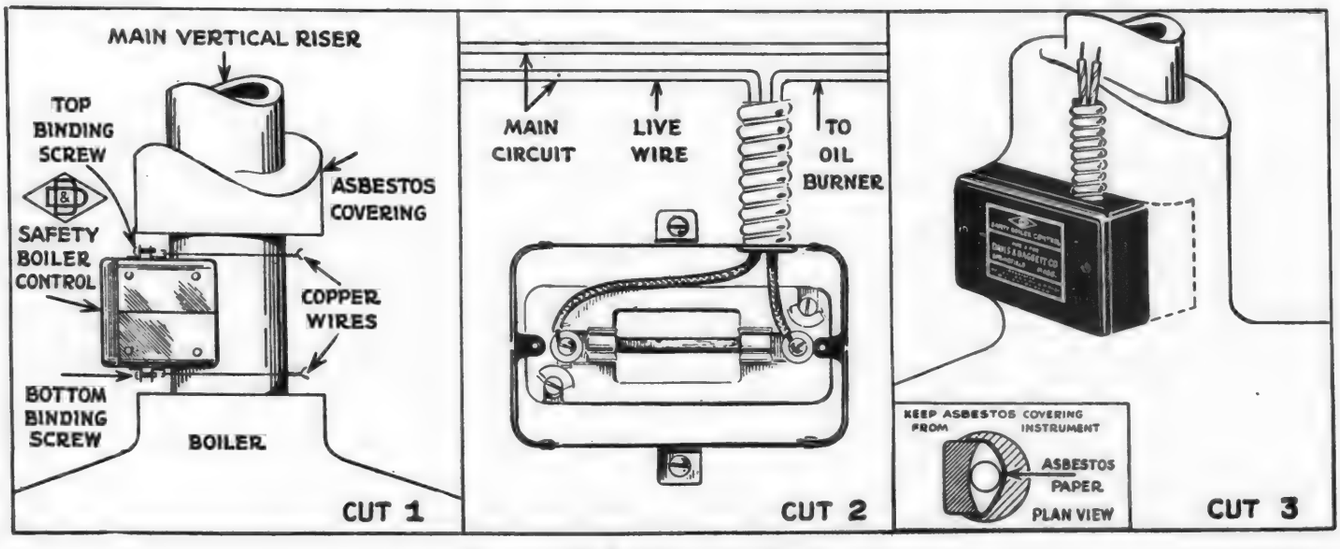
Simple Safety Boiler Control

A new control, designed to protect a boiler when fired by an automatic oil burner, has been placed upon the market by Davis and Daggett Co., Springfield, Mass. The main features of this control are its simplicity and the ease with which it may be installed, as it is not necessary to cut into the existing installation in any way. The control is a surface-type instrument, which is mounted on a flow pipe from the boiler, and contains a thermal member which is connected in series with the main electrical circuit supplying current to the motor of the oil burner.



Safety D. & D. Boiler Control on Flow Pipe

The thermal member is in close proximity to the bare pipe, but not in contact with it, and is protected from external radiation by the cover of the control. The thermal member is so designed that it will melt when the temperature



Details of D. & D. Safety Boiler Control

RADIATION COMPUTING

Application of Heating and Piping Contractors National Association Formula

(Continued from Data Sheet No. 13 A2)

The formula as finally developed by the association's Committee on Standardization is as follows:

$$\frac{(W + G + I)\ (T_1 - T_o)\ E + O\ (T_1 - T_a)}{R} = \text{square feet radiation}$$

Where

W — Net area in square feet of exposed wall × K.

G — Area in square feet of full frame opening of window or doors × K.

O — Net area in square feet of roof, floor or any exposure not included above × K.

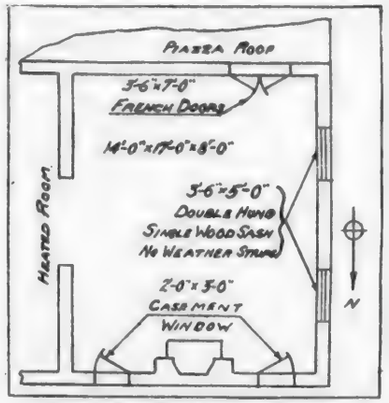
I — Lineal feet of window or door crack × infiltration in cubic feet per hour per lineal foot of crack as shown on Data Sheet No. 13A2. × 0.018.

K is the coefficient of transmission as shown on Data Sheets Nos. 13C2 and 13D2 for the particular material.

E is the exposure factor as shown on Data Sheet No. 13A2 for the particular locality and direction of exposure.

T_1 is the desired room temperature.

T_o is the base temperature as shown on Data Sheet No. 13A2 for the particular locality.



Plan of Room Used in Typical Problem

T_a is the temperature of adjacent spaces of a different temperature from T_1.

R is the number of heat units emitted per hour by 1 sq. ft. of radiation.

To show the application of the formula, the accompanying plan may be taken of a second-floor room with 8-in. brick wall, furring, lath and plaster; also lath and plaster ceiling with unheated roof space above, located in Chicago, Ill.

For a room temperature of 70° F. and a steam pressure of 1 lb. gauge, and for standard 3-col. 38-in. direct steam radiators, a factor of 225 B.T.U. per square foot is used.

This figure is to be multiplied by the following factors for the equivalent of 3-col. 38-in. radiation of the following types:

Wall coil, 0.75; double wall coil, 0.90; ceiling coil, 1.00; wall radiator, 0.82; double wall radiators, 1.00; wall radiator (ceiling), 1.00.

In open return-line vapor systems, on which thermostatic traps are not used, 10% to 20% additional surface is required in each radiator to act as a condenser and to prevent flow of steam into the return main.

(Continued on Data Sheet No. 13 C2)

How Required Radiation Was Determined in Typical Problem

NAME	MATERIAL	EXPOSURE	WIDTH (Ft)	HEIGHT OR LENGTH (Ft)	AREA OR LIN. FT. CRACK	FACTOR	TEMPERATURE DIFFERENCE	NET B.T.U. REQUIRED	EXPOSURE FACTOR	TOTAL B.T.U. REQUIRED	RADIATOR FACTOR	TOTAL RADIATION
GLASS	FRENCH DOOR	S	3½	7	24½	1.1	60°	1617	1.15	1860		
WALL	8 BRICK F.L. AND P.	S	14	8	87½	.27	60°	1418	1.15	1631		
INFILTRATION	FRENCH DOOR	S			28	1.8	60°	3024	1.15	3478		
GLASS	WINDOW	W	5	5	30	1.1	60°	1980	1.33	2640		
WALL	8 BRICK F.L. AND P.	W	17	8	106	.27	60°	1717	1.33	2289		
INFILTRATION	DOUBLE HUNG WINDOW	W			38	.9	60°	2052	1.33	2735		
GLASS	WINDOW	N	6	2	12	1.1	60°	792	1.25	990		
WALL	8 BRICK F.L. AND P.	N	14	8	100	.27	60°	1620	1.25	2025		
INFILTRATION	CASEMENT	N			20	1.8	60°	2160	1.25	2700		
CEILING	LAND PIND ROOF SPACE	-	14	17	238	.49	40°	4665	—	4665		
										25013	225	111

RADIATION COMPUTING

Heating and Piping Contractors National Association Standard Radiaiton Estimating Tables

In compiling the Standard Radiation Estimating Tables, originated by the Heating and Piping Contractors National Association, special attention has been paid in each case to the effect of wind direction, on account of the fact that in some sections the prevailing wind is not from the north, so that the usual exposure factors do not apply, but have to be modified for different localities.

Another factor considered in the compilation of the tables is that the amount of air change in a room is practically not dependent upon the size of the room at all, but on the amount of crack area around and across the window and that leakage or inleakage varies with the type of sash construction. Tests indicate a definite inleakage for each type and these are incorporated in the calculations.

Direction and velocity of wind have a marked effect on the amount of radiation required to heat a building. One mile of wind velocity, it was found, is equivalent to 1° drop in temperature. In other words, for ease of calculation, a 15-mile wind, with a 15° temperature, is equivalent to zero with no wind.

It was further found that all of the factors used in calculating radiation, that is, glass and walls and inleakage, were based on a wind factor so that when 1.1 B.T.U. per square foot of glass was used as a factor, it was the transmission with a 15-mile wind.

This being the case, it became necessary to find the prevailing temperatures in the various sections of the country and the prevailing wind directions and wind velocities with these temperatures. The base temperature of zero ordinarily used was found to be erroneous when the factors of transmission and infiltration are based upon a 15-mile per hour wind velocity. This factor must be deducted to get a true base condition.

For instance, Chicago, which has always been figured with a —10° base temperature, under the new method of allowance, has a base temperature of 5° F. West is the worst exposure and affects southwest and northwest to the same extent, necessitating the addition of 25% to wall and glass and infiltration on these points of the compass.

CITY	Base Temp.	POINTS OF COMPASS							
		N	NE	E	SE	S	SW	W	NW
Birmingham	+30°	1.15	1.15	1.0	1.0	1.0	1.05	1.15	1.15
Boston	+15°	1.30	1.10	1.0	1.0	1.0	1.30	1.30	1.30
Buffalo	0°	1.0	1.0	1.0	1.0	1.25	1.40	1.40	1.40
Chicago	+ 5°	1.20	1.0	1.0	1.0	1.10	1.25	1.25	1.25
Cincinnati	+15°	1.10	1.0	1.0	1.0	1.35	1.35	1.35	1.20
Cleveland	+ 5°	1.15	1.08	1.08	1.0	1.08	1.15	1.15	1.15
Denver*	+20°	1.30	1.30	1.20	1.25	1.25	1.25	1.0	1.30
Detroit	0°	1.10	1.0	1.0	1.0	1.10	1.10	1.10	1.10
Eastport, Me.	+10°	1.40	1.20	1.20	1.0	1.0	1.45	1.45	1.45
Kansas City, Mo.	+15°	1.45	1.35	1.0	1.0	1.10	1.10	1.45	1.15
Los Angeles	+50°	1.50	1.50	1.50	1.0	1.0	1.0	1.50	1.50
Madison, Wis.	+ 5°	1.25	1.15	1.10	1.0	1.10	1.25	1.25	1.25
Memphis, Tenn.	+30°	1.40	1.20	1.10	1.0	1.30	1.30	1.40	1.40
Milwaukee	+ 5°	1.20	1.0	1.0	1.0	1.10	1.25	1.25	1.25
New York	+10°	1.50	1.25	1.0	1.0	1.0	1.33	1.50	1.50
Philadelphia	+15°	1.20	1.10	1.10	1.0	1.0	1.0	1.20	1.20
Pittsburgh	+15°	1.30	1.0	1.0	1.0	1.30	1.35	1.35	1.35
Portland, Ore.	+25°	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Salt Lake City	+25°	1.10	1.0	1.10	1.10	1.10	1.0	1.10	1.10
San Antonio, Tex.	+45°	1.70	1.70	1.40	1.0	1.0	1.0	1.70	1.70
San Francisco	+45°	1.20	1.20	1.20	1.0	1.0	1.0	1.0	1.15
St. Louis	+20°	1.30	1.20	1.0	1.20	1.20	1.20	1.30	1.30
St. Paul	— 5°	1.20	1.0	1.0	1.0	1.0	1.10	1.20	1.20
Washington	+20°	1.20	1.0	1.0	1.0	1.0	1.0	1.20	1.20

*Base temperature and exposure factors based on actual Weather Bureau records, but, due to rapid changes and high altitude, square feet of radiation in Standard Radiation Estimating Table is figured on 200 B.T.U. emission, instead of 225 B.T.U.

Table 1
(Specific Heat of Air, 0.018)

TYPE OF OPENING	Cubic Feet per Hour per Lineal Foot of Crack	Factor
Double-Hung Wood Sash	50	0.9
Same with Metal Weather Strip	25	0.45
Stationary Wood Sash	25	0.45
Double-Hung Steel Sash	100	1.8
Same with Metal Weather Strip	50	0.9
Fenestra-Type Sash	100	1.8
Casement Windows	100	1.8
Same with Metal Weather Strip	50	0.9
French Doors	100	1.8
Same with Metal Weather Strip	50	0.9
Outside Doors	200	3.6
Same with Metal Weather Strip	100	1.8
Same with Storm Door	100	1.8
Same with Inner Vestibule Door	100	1.8

(Continued on Data Sheet No. 13 B2)

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RADIATION COMPUTING

Heating and Piping Contractors National Association Heat Loss Factors for Usual Types of Construction

(*Continued from Data Sheet No. 13 C2*)

	Factor (K)
Concrete, furring, lath and plaster:	
8-in.	.50
12-in.	.40
16-in.	.34
18-in.	.32
20-in.	.31
24-in.	.28
28-in.	.25
Stucco:	
Tile, stucco outside, plaster inside:	
4-in.	.40
8-in.	.31
12-in.	.26
Frame and stucco construction:	
(Constants same as for clapboard wall)	
Frame Walls:	
Clapboards on studding	.70
Clapboards and paper on studding	.48
Clapboards, studding, lath and plaster	.45
Clapboards, paper, studding, lath and plaster	.31
Clapboards, paper, sheathing, back plaster, lath and plaster.	.21
Clapboards, paper, sheathing, studding, lath and plaster	.24
Clapboards, sheathing, studding, lath and plaster	.29
Clapboards, sheathing, sawdust, lath and plaster	.15
Steel:	
Unlined corrugated iron (Area is protected area, not corrugated area)	1.50
Sheet metal, siding unlined	1.20
Board:	
Plain tongue and grooved board: 1-in.	.65
Corrugated iron, tongue and grooved boards: 1-in.	.60
Corrugated iron, paper, tongue and grooved boards: 1-in.	.56
Partition:	
Stud partition, lath and plastered, one side	.60
Stud partition, lath and plastered, both sides	.33
Floors, basement:	
Dirt	.20
Cement or concrete on dirt	.31
Note: For all floors above frost line, the temperature of the floor may be assumed to be half the difference between room temperature and outside temperature.	
Wood floor and sleeper on dirt	.13
Wood on sleepers and cinders on dirt	.12
Floors; intermediate:	
Single floor, no plaster	.29
Double floor, no plaster	.20
Single floor, lath and plaster below joist	.19
Double floor, lath and plaster below joist	.13
Wood flooring, filling, air space, lath and plaster	.05
Ceilings:	
Lath and plaster, with wood flooring above	.28
Lath and plaster, with roof space above	.49
Note: Temperautre of attic space is assumed to be half the difference between room temperature and outside temperature.	
Wood, with wood floor above	.40
Wood, with paper lining and wood floor above	.25
Steel, with wood floor above	.35
Roofs:	
Tar and gravel on concrete:	
2-in.	.80
4-in.	.60
6-in.	.53
Tar, gravel and ¾-in. insulator on concrete:	
2-in.	.36
4-in.	.31
6-in.	.29
Metal on tongue-and-grooved sheathing	.42
Metal on wood frame	1.30
Corrugated iron on wood frame	1.80
Tile or slate, with paper on wood sheathing	.38
Tile or slate on wood sheathing	.80
Tar and gravel, tar paper, wood planking:	
1-in.	.30
2-in.	.26
3-in.	.21
Tar and gravel, concrete, hollow tile:	
6-in.	.38
8-in.	.36
Tar and gravel on concrete and suspended lath and plaster	.30
Shingles, sheathing and studding	.40
Shingles, studding, lath and plaster	.30

(*Continued on Data Sheet No. 13 E2*)

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THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. C.

RADIATION COMPUTING

Heating and Piping Contractors National Association Heat Loss Factors for Usual Types of Construction

(*Continued from Data Sheet No. 13 B2*)

	Factor (K)
Glass:	
Single window	1.1
Single window, with double glass	0.6
Double window	0.6
Skylights:	
Single light	1.3
Ceiling light	0.8
Single monitor	1.3
Iron or cement vault glass	1.25
Doors:	
Single door	1.1
Double door	0.6
Inner vestibule door	0.6
Walls:	
Brick, no lath or plaster:	
4-in.	0.60
8-in.	.42
12-in.	.32
16-in.	.26
18-in.	.25
20-in.	.23
24-in.	.20
Brick, plaster one side only:	
4-in. (thickness of brick wall only)	.49
8-in.	.38
12-in.	.29
16-in.	.25
18-in.	.24
20-in.	.22
24-in.	.19
Brick, furring, lath and plaster:	
4-in. (thickness of brick wall only)	.33
8-in.	.27
12-in.	.23
16-in.	.21
18-in.	.20
20-in.	.19
24-in.	.16
Brick, 4-in. hollow tile and plaster on one side:	
4-in. (thickness of brick wall only)	.30
8-in.	.26
12-in.	.22
16-in.	.20
20-in.	.18
24-in.	.15
Brick, plain, with 4-in. sandstone face:	
4-in. (thickness of plain wall)	.41
8-in.	.34
12-in.	.28
16-in.	.23
20-in.	.19
24-in.	.17
28-in.	.15
Brick, plain, with 8-in. sandstone face, plastered:	
4-in.	.35
8-in.	.29
12-in.	.24
16-in.	.20
20-in.	.18
24-in.	.16
28-in.	14
Brick, plain, with 12-in. sandstone face, furred and plastered:	
4-in.	.30
8-in.	.25
12-in.	.21
16-in.	.19
20-in.	.17
24-in.	.15
28-in.	.13
Sandstone, plain, granite or marble:	
8-in.	.60
12-in.	.48
16-in.	.41
20-in.	.37
24-in.	.33
28-in.	.29
30-in.	.28
Sandstone, furring, lath and plaster:	
8-in.	.50
12-in.	.40
16-in.	.34
18-in.	.32
20-in.	.31
24-in.	.28
28-in.	.25
Limestone; plain:	
8-in.	.63
12-in.	.51
16-in.	.43
18-in.	.41
20-in.	.39
24-in.	.35
28-in.	.31
Limestone, furring, lath and and plaster:	
12-in.	.43
16-in.	.36
18-in.	.34
20-in.	.32
24-in.	.29
28-in.	.27
30-in.	.25
Concrete:	
8-in.	.60
12-in.	.48
16-in.	.41
20-in.	.37
24-in.	.33
28-in.	.29
30-in.	.28

(*Continued on Data Sheet No. 13 D2*)

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The Heating and Ventilating Magazine's Data Sheets Nos. 13-C2 and 13-D2

of the pipe reaches 250° F. There are no moving parts, and no contacts to be broken. This control forms an effective preventive of damage to a boiler, due to low water. The D & D safety boiler control may be used on either steam or water boilers, and is adaptable for any size riser from 1½ in. up. It is furnished complete at a low price, and may be attached in a few minutes time.

Trane Announces New Heavy-Duty Blast Trap

A new heavy duty blast trap has just been placed upon the market by Trane Co., La Crosse, Wis. The operating mechanism of this trap is based upon seven of the standard thermostatic bellows that have been used in Trane radiator traps. These bellows are not interconnected, but each functions by its own power, closing its respective outlet, when steam reaches it. These traps are designed for any drainage service where an ordinary steam trap might be used. No auxiliary vents are needed where these traps are in operation. The traps are made in three sizes: 1¼ in., 1½ in. and 2 in., with capacities ranging from 1000 to 15000 lbs. of water per hour. They are normally supplied

Trane Heavy-Duty Blast Trap

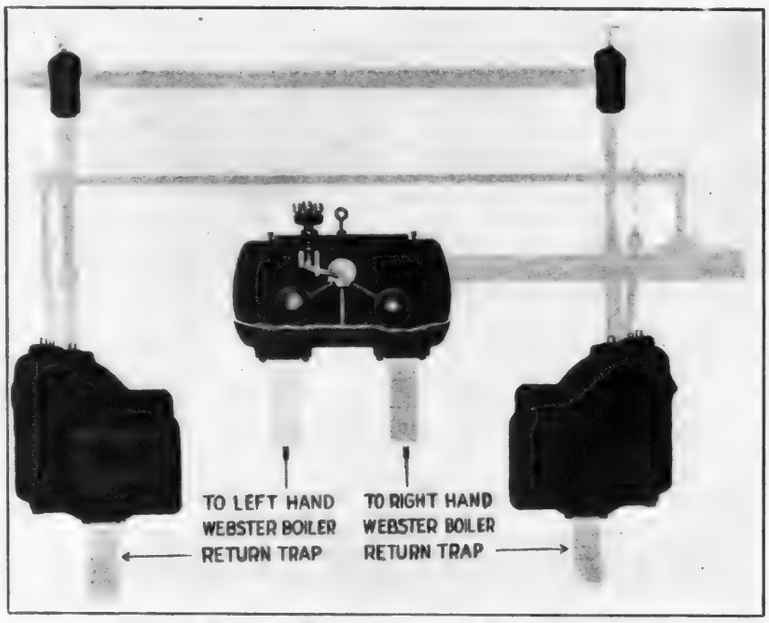
for service on pressures up to 125 lbs. Inasmuch as the life of a thermostatic trap, of this character, is dependent upon the life of the thermostatic elements used in it, it is interesting to note a series of tests that have been made to determine the physical charateristics of these bellows.

The first test was designed to show precision and interchangeability of parts. Three trap bodies, three bellows and three trap covers were selected at random from stock, assembled and tested. All three of the traps came through with a perfect score.

The second test was a mechanical breakdown test. A number of bellows were connected to a mechanical device for opening and closing them as they open and close in service. Twenty million complete operations failed to harm the bellows. This, obviously, is more service than a bellows would be required to give in a thousand years of actual service.

The third test was to show sensitiveness. A bellows trap, with holes cut in the body, was attached to a source of steam supply. Steam caused the bellows to expand. By merely blowing lightly against the bellows, temperature was lowered enough to cause the bellows to open.

The fourth test was a durability test, and was made under the direction of engineers of the Ford Motor Company before they accepted this particular trap. The traps on test were frozen in water and then the temperature was raised until the thermostatic element was surrounded by steam pressure of 75 lbs. After that the traps were given the regular operating tests and were found to be functioning perfectly, showing no difference in length and no weakening of any kind.



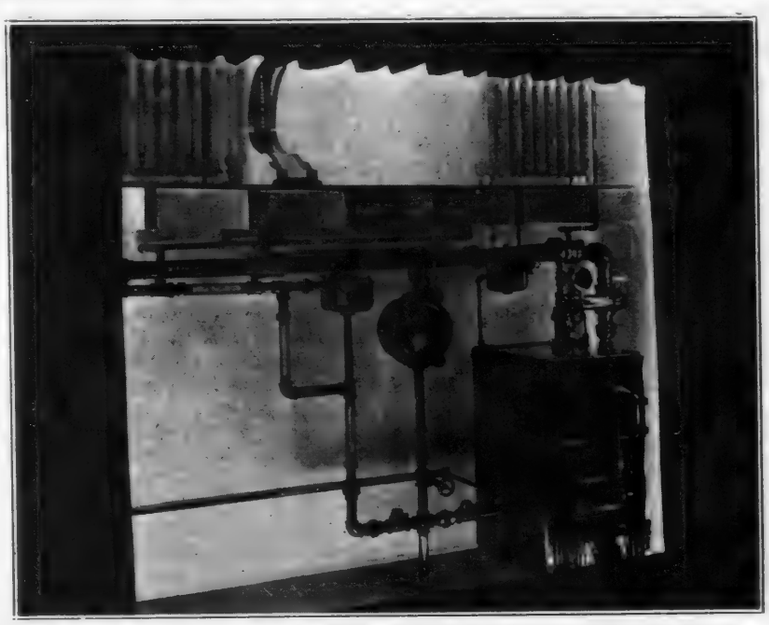
Salient Parts of Webster Type R Heating System

Demonstrating a Vapor Heating System

An interesting method of demonstrating the operation of a vapor system was a feature of the exhibit of Warren Webster & Co., Camden, N. J., at the two recent Power Shows, held recently in New York and Chicago. This exhibit comprised a working model of the Webster Type R modulation system. The supply and return risers were shown leading from the basement, as well as the radiators on the first floor. The boiler and damper regulator, together with the supply piping were reduced to three-quarter size to provide an exhibit of convenient dimensions. This was possible because these parts of the exhibit were actually dummies of wood.

The central feature consisted of a Webster No. 0023 vent trap and boiler return trap, piped up in accordance with Webster standards and in actual operation. As it was not feasible to use steam, the condition that actually occurs was simulated by the use of air and water.

Large glass panels and glass openings



Demonstration Outfit of Webster Type R Modulation Heating System

in the return piping made the operation clear. For a time the water would return direct to the boiler by gravity, then, as the pressure rose, the water would back up in the Webster boiler-return trap until it tripped, equalizing the pressure and permitting the water to return from the return trap to the boiler. While this water was returning, the condensation could be seen backing up into the Webster vent trap.

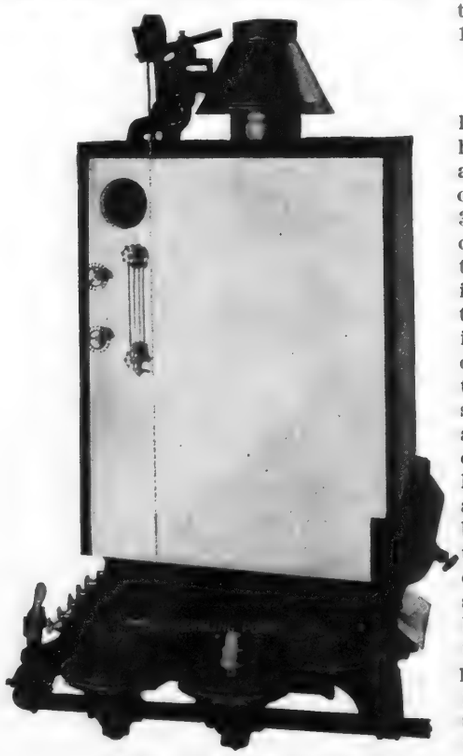
To show that the Type R system was not adopted only to residences and small buildings, a display sign on the exhibit emphasized the fact that they were also adaptable to office buildings, hotels, schools, apartments and factories and other types of structures requiring from 500 to 32,000 sq. ft. of equivalent direct cast-iron radiation.

To further bring out the fact that the Type R system was not limited to small buildings a multiplex display frame was placed at one side of the exhibit. This display included five panels each devoted to a different use Webster boiler-return trap and vent trap combination.

Following the exhibit of the model at the Power Show in Chicago it was planned to move the model back to Camden where it will occupy a booth at the South Jersey Exposition, a large show that will be held on the New Jersey side of the river coincident with the Sesquicentennial Exhibition of 1926 in Philadelphia.

New Trade Publications

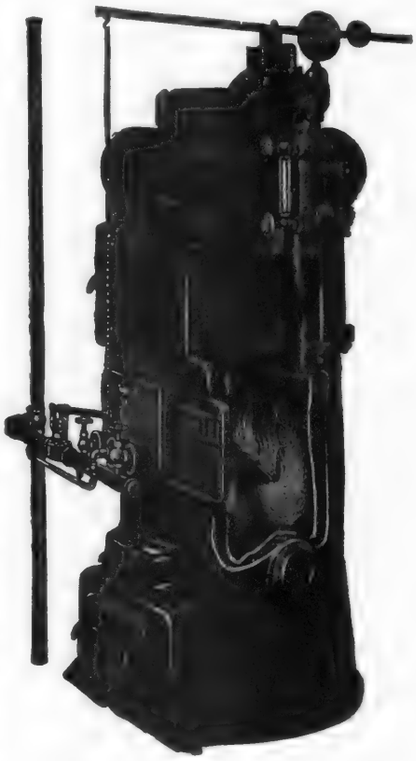
B-Line Products are the subject of an exceptionally complete and beautifully-printed catalog being circulated by the C. L. Bryant Corp., Cleveland, O. and describing the gas-heating boilers, hot water generators, storage systems and gas boiler accessories manufactured by this company. B-Line gas boilers are built up of cast-iron sections from which, it is claimed, 85% of the heat from the gases is absorbed by the water. The sections are assembled with die-cast push nipples. An interesting feature of this boiler is the secondary air regulation which prevents the boiler from being robbed of heat when the gas is turned off through the natural draft of the chimney. This regulation is automatic and is obtained by gas pressure. When the gas is off, the regulator closes so that the heat remains in the boiler, instead of being allowed to escape through the flue. The principal line of water-tube steam boilers is filled in 26 sizes, ranging from 600 sq. ft. to 8000 sq. ft. of radiation. Special boilers are also built for vapor and water systems. Two special units are also shown, one for steam and one for water, developed to provide for small bungalows or for use in dressing-rooms and baths as separate units. These are ranged at 100 sq. ft. of steam or 150 sq. ft. of water radiation. A number of types of hot water generators are shown, with capacities suitable for the smallest bungalow and for the largest apartment house or its equivalent. The catalog concludes with a bound-in set of specifications for B-Line boilers and suggestions for their installation. Size 8½ x 11 in. Pp. 24.



B-Line Gas-Fired Boiler

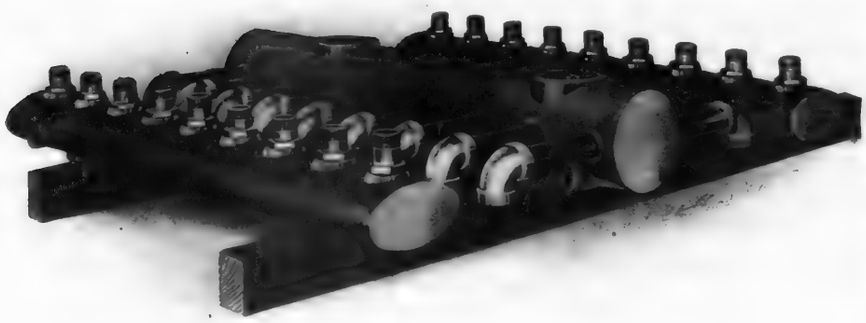
Frank Wall Radiator Brackets, legless radiator brackets, steel expansion hook plates, and steel offset hook plates, as described in a recently-published circular of the Frank Radiator Bracket Co., 30 North La Salle St., Chicago, Ill., are of ingenious construction. The fact that the inventor of this line, John C. Frank, is an experienced steamfitter, gives him the advantage of knowing the problems involved in this work and of the practicability of his designs. Care has been taken to have the units of rugged construction. Both horizontal and vertical adjustment is provided for. Another characteristic of the Frank type of legless radiator brackets is the fact that although four holes are punched in the back, only one bolt is used in bolting the bracket to the wall, thus effecting a considerable saving in drilling and inserting bolts. The bottom end of this bracket is flattened and turned out for the radiator to rest against, holding it plumb. This has an additional adjusting plate, in case the wall is not plumb. A similar type of bracket is furnished for two runs of wall radiators. Size 4 x 8¾ in. Pp. 20.

Heat By Gas—The Franklin Way is the caption of a new circular distributed by The Franklin Gas Burner Mfg. Co., Cincinnati, O. In this circular is featured the Franklin burner designed particularly for use in conventional boilers and furnaces to replace coal in the Spring and Fall. The statement is made that "Our engineers have proven that the most economical method of heating is one that alternates gas and coal, according to weather conditions." The Franklin burner described in this circular is designed to be inserted through the bars of the boiler or furnace so that coal may be used at any time without disturbing the burner installation. It is even possible to burn both coal and oil at one time.



Franklin Gas Burner Installation

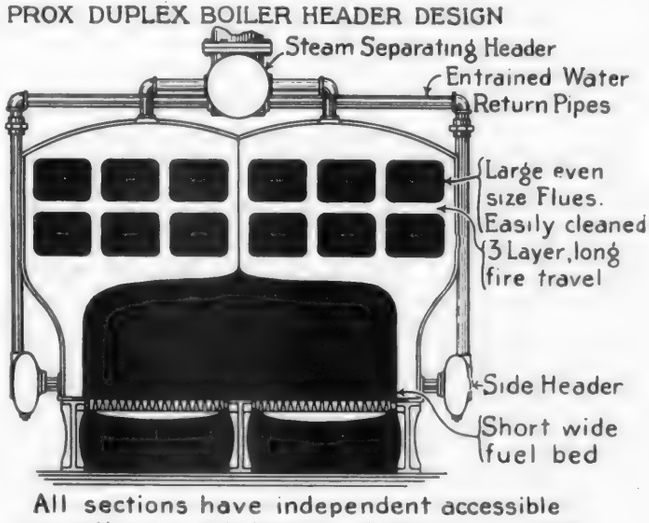
Barber Patented Jet Gas Burners are described in an attractive catalog recently prepared by the Cleveland Gas Burner and Appliance Co., Cleveland, O. The Barber burners are made in a large number of shapes, sizes and grades, all incorporating the ideas of the original Barber patent, with the addition of jets which provide for the introduction of auxiliary air above the gas orifices, causing a free mixture of gas and air in the jet. These jets are arranged in pairs so that the flames create a vacuum, which draws into them such additional air as is required to develop combustion to the highest practicable point. The booklet also shows the application of Barber burners to water heaters of various types and to hot water and steam boilers and warm air furnaces. Tables are also given showing the gas consumption of various burners with both natural and manufactured gas.



Distinctive Header of Prox Boiler

PROX BOILERS are featured in a catalog recently issued by Frank Prox Co., Terre Haute, Ind. The Prox smokeless boiler is the up-draft type with a single-layer grate. To secure smokeless combustion a section called the "hot blast section" is set across the boiler, dividing it into a fire-box and a combustion chamber. The hot blast section is lined with tile blocks, and it is the intention of the design that incoming fresh air is preheated and ejected into the volatile gases from the fuel bed where they pass through the hot blast section. By using the radiant heat emission from the refractory materials at this point, thorough combustion is secured in the combustion chamber. From this chamber the gases pass upward into the lower gas manifold and then up to the rear of the boiler; thus making three circuits, two of which are the entire length of the boiler. It is stated that nearly forty years of manufacturing this type of boiler has produced a time-tried product with no radical features or elements that have not been thoroughly demonstrated by use. The catalog includes several pages of photographs of impressive buildings in which Prox boilers have been installed. The header design boilers, of which 186 sizes are available, are interesting in that they provide for the removal of any section that may be damaged, without interrupting the service of the boiler. In this case the broken section may be readily slipped sidewise from the boiler and replaced by a new section exactly as a book may be taken from a library shelf. The catalog is well illustrated and contains complete information on each size and type of boiler. Size 8½ x 11 in. Pp. 32.

TESTED AND PROVED is the title of a little folder issued by the D. & T. Mfg. Co., St. Louis, Mo., and devoted to the subject of the Simplex air-sealed expansion tank for hot-water systems. This tank is designed for installation in the basement and it is stated that over 100,000 are in use. It is interesting to note that the D. & T. Manufacturing Company has developed a unit package in which the tank and the necessary vacuum-breaking valve for automatically charging the tank with air, the relief valve, thermometer and gauge are shipped. This basement tank is guaranteed for five years and presents an interesting solution of a frequently troublesome problem.


PROX DUPLEX BOILER HEADER DESIGN
Steam Separating Header
Entrained Water Return Pipes
Large even size Flues. Easily cleaned
3 Layer, long fire travel
Side Header
Short wide fuel bed
All sections have independent accessible connections to side header and steam separating header. This insures continuous heat, ease in replacing broken sections and dry steam to the mains.

General Scheme of Prox Boiler Construction

MONARCH MANUAL is an ambitious publication by the Monarch Metal Products Co., St. Louis, Mo., and is in fact a very complete compendium of data on heat losses from buildings. It is divided into seven sections with the following headings:

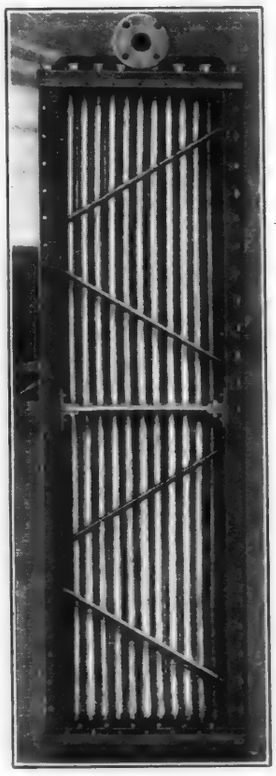
1. Data on Heat Transmission and Infiltration Losses Through Walls, Roofs and Ceilings.
2. Infiltration and Transmission Losses for Double Hung Sliding Wood Windows.
3. Infiltration and Transmission Losses for Double Inswinging Wood Casement Windows.
4. Infiltration and Transmission Losses for Wood Doors.
5. Transmission and Infiltration Losses for Side Pivoted Factory Steel Ventilators.
6. Architects' Details and Specifications for Monarch Metal Weatherstrips.
7. General.

As might be expected, the data presented on infiltration and heat losses for various types of doors and windows is voluminous. In section 6 is incorporated details showing the installation of Monarch metal weatherstrips for all classes of openings. There follows a copy of the code for testing metal weatherstrips as prepared by the structural service committee of the American Institute of Architects, and the last section contains a very interesting story of infiltration research to date. In this is told the results of the tests made by Stephen Voorhees for the New York Telephone & Telegraph Company, the tests made by the A. S. H. & V. E. Research Laboratory at Pittsburgh, and following this, the investigation made by the Monarch Metal Products Company to determine the average crack around the perimeter of windows. The third investigation consisted of tests on double hung sliding wood windows based on the average condition of the sash and frame of the window. The fourth and last investigation consisted of tests on wood casement windows and doors, a report of which was read before the annual meeting of the A. S. H. & V. E. in January, 1925. by C. C. Schrader of the Research Laboratory. A copy of this report is incorporated in this publication. An analysis of infiltration tests on double hung sliding wood windows is given, summarizing and comparing the results of all research to date. Detail tables are given showing the manufacturer's standard working clearances, this data being compiled from information secured by the Monarch field staff. The section concludes with a reprint of papers on the subject of air leakage through the openings in buildings, as published in the official journal of the A. S. H. & V. E. for January and June, 1924, and January, 1925.

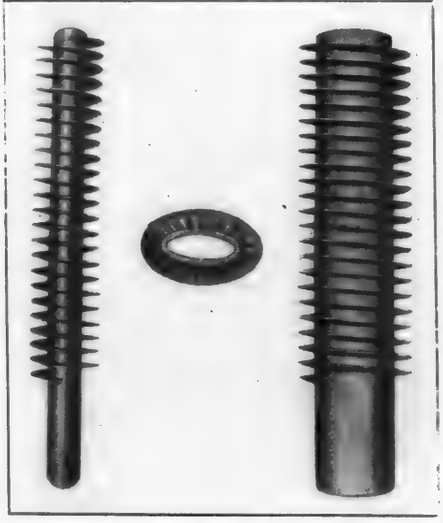
This compilation should be of value to everyone who requires working data on this subject, as the information is presented in such form as to be readily usable. Size 8½ x 11 in. Pp. 111; loose-leaf binders. Price $1.00.

FEIGEN ROCK CORK INSULATING PRODUCTS are described in a catalog recently issued by the Feigen Insulating Co., Indianapolis, Ind. Rock cork is a combination of mineral wool and binder with a low conductivity, low specific gravity and low specific heat. Its base is an inorganic mineral product composed of a structure of approximately 85% voids. It possesses unusual structural strength, is non-inflammable and will not crack with alternate heating and cooling, or wetting and drying. This insulation is furnished for boilers, heaters, and pipes above ground, as well as for underground use. The sections for pipe covering are reinforced with perforated steel bands imbedded in the material. It is stated that this insulation will eliminate at least 90% of the heat loss that would occur from bad pipes. The catalog contains a full listing of sizes and classes of this material available, illustrations of its use and instructions for application. Size 7 x 10 in. Pp. 12.

KOERTING RADIAFIN GENERATOR AIR COOLER describes a refinement in the development of airfin radiators manufactured by the Schuette & Koerting Co., Philadelphia. The air coolers designed in this bulletin are specifically for use in maintaining the temperatures of generator windings below the point at which the insulation breaks down. The bulletin calls particular attention to the advantage of the closed-circuit method of generator cooling over the open circuit system, largely because of the elimination of dirt and foreign matter from the air passing through the generator windings. With an open-circuit system, the foreign matter in the air finds a lodgement in the small apertures between windings and the generator in this case actually acts as an air filter, gradually clogging its own radiating duct. This means the frequent cleaning of the generator, an expensive and often an inopportune proceeding. The Radiafin air coolers are mainly interesting due to the shape of the tubes employed. These are oval, rather suggestive of a streamline shape and permit a higher rate of heat transfer than in the case of circular tubes. Furthermore, with this shape, a cooler of given capacity can be condensed into a smaller volume. These tubes are each wrapped with thin copper fins, giving a helical form. These fins are then tinned to the tubes in order to insure a perfect bond. The bulletin is thoroughly illustrated and contains much technical information of value. Size 8½ x 11 in. Pp. 8.



Koerting Radiafin Unit



Details of Koerting Radiafin Construction

HARDINGE—THE FUEL OIL BURNER WITH A TEN-YEAR GUARANTEE, is the title of a folder being distributed by Hardinge Bros. Inc., Chicago, featuring their guarantee that each burner manufactured by them is warranted free from defects in material and workmanship, for a period of ten years from date of installation. The company back of this burner was established in 1890 and since that time has built up an international reputation as manufacturers of precision machinery. For five years, foreseeing the development of the oil burning industry, experimental work was carried on until the burner was developed to its present point.

It is not infrequently referred to as "The Rolls-Royce oil burner." The statements made in the circular are outstanding in their conservatism and the impression is gained from it that the burner is thoroughly developed by a well-established manufacturer and that through the excellence of design and careful workmanship, its sale will be followed by a minimum of service requirements.

HONEYWELL HEATING SPECIALTIES, a story of the equipment manufactured by the Honeywell Heating Specialties Co., Wabash, Ind., is one of the most interesting examples of the printers' art, that has appeared as a trade catalog. The arrangement of matter and the typography are exceptional, the cuts of the various instruments being shown against a background of blue in a very effective manner. After describing the 20-day clock thermostat, and the plain type of thermostat, several interesting and highly developed details are shown. The Honeywell wall plate is devised to facilitate installation. It is fastened to the wall in the proper location and the thermostat secured to it by means of bayonet catches.

A clever device is the testing base, which consists of a dummy form on which the thermostat may be temporarily mounted, through the medium of clips. The thermostat cover is removed and the thermostat indicator set to correspond with the reading of the thermometer. The adjusting cam on the thermostat is then turned with a screwdriver until two miniature lights on the testing base are extinguished, in which condition the thermostat is in perfect adjustment. This base is also used in demonstrating the sensitiveness of the thermostat as, with the thermostat in perfect adjustment, the heat from the hand, or breath on the blade of the thermostat, is sufficient to cause it to operate the lights.

The Honeywell Type-D Electric regulator motor is described, as are also the spring motor and gravity motor, for use where electric current is not available. Then follow descriptions of the Vaporstat, Aquastat, and Airstat, for each of which a diagram is provided showing connections. The remote-control motor-operated valve, for controlling the flow of gas to the burners of domestic heating systems, tank heaters and industrial installations is also pictured and described.

The type-DS motor switch, especially designed to handle the various operations of automatic oil burners in the proper sequence, is one of the recent developments of the company to provide for the requirements of the oil-burner manufacturers. The new Type B combustion safety control is a stack thermostat device, its function being to stop the feeding of oil to an oil burner in case the oil fails to ignite. This instrument forms a part of the Honeywell High-Low system of automatic control. The Honeywell Masterstat forms a protection against the firing of a dry boiler, and operates to shut off the burner in case excessive boiler temperature or pressure develops.

The Honeywell method of induced circulation provides for a device called the

Furnacestat which is a warm-air temperature control device in combination with an Aerofan, which is a forced-draft producer consisting of a stream-lined electric motor with a two blade airplane propellor type fan. The feature of this design is that introduction into the furnace air intake does not interfere with the natural circulation of air, when forced circulation is not required. The Honeywell valves and water regulator are two of the older specialties of this company and the Honeywell heat generator, which formed the basis of its earlier output, complete the material in the book. Size 8½ x 11 in. Pp. 30.

New Publications

TRANSACTION OF THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, VOL. 30, 1924, and VOL. 31, 1925, have been issued by the society. In each case the volumes cover the proceedings for the annual and semi-annual meetings of the years indicated. The 1924 volume contains, among other things, the Comfort Zone Chart, printed in colors, as developed by the A. S. H. & V. E. Research Laboratory, accompanied by instructions for its use. The proceedings take up 416 pages, making it one of the largest volumes for a single year's Transactions the society has issued. The 1925 volume contains 287 pages and it notable for its psychrometric charts showing effective temperature lines for still air conditions and for conditions with 300 ft. per minute air velocity, in both cases with individuals normally clothed and slightly active. Published by the American Society of Heating and Ventilating Engineers, 29 West 39th street, New York, or may be had through the book department of the HEATING AND VENTILATING MAGAZINE. Price of each volume, $5.00, postpaid.

PROCEEDING OF THE NATIONAL DISTRICT HEATING ASSOCIATION for 1925, containing the papers, reports and discussions at the meeting in West Baden, Ind., last May, have been published, making a volume of 209 pages. The address of L. E. Young, of the Union Electric Light & Power Company, of St. Louis, on the coal situation, which was given from notes and which attracted so much interest, is given in full. Size 6x9 in. Pp. 209, and index.

Fatal Fan Wheel Accident

A tragic death overtook Howard Grimes, engineer in charge of air conditioning and drying for the Dupont Silk Company, on New Year's Eve, as the result of an accident a few days previous in the company's mill, in Nashville, Tenn. In some way Mr. Grimes, who is supposed to have been oiling the bearing of a piece of new equipment, became entangled in a rapidly-revolving fan wheel, losing his left arm and breaking his right arm in four places.

The circumstances attending Mr. Grimes's death call fresh attention to the need of precautionary measures necessary when at work on or around such equipment. In one case, for example, a new fan was being painted inside and a sign "Painter Inside" was placed over, but not attached to, the fan motor switch. In some manner it became dislodged from its position and fell to the floor. It was providentially discovered by the engineer just as he was about to throw the switch. If the sign had been blown by the open door, a few feet further away, it might easily have passed unnoticed. The sign, of course, should have been attached to the switch, or better yet, the switch should have been locked.

Fan equipment is usually installed in crowded spaces. The infrequent attention required invites carelessness and the small clearance along belts makes accidents easy, unless the precaution has been taken to install pipe-rail guards along such belts and machinery in motion.

Clow Occupies New Building

Early in January James B. Clow & Sons, Chicago, moved into what is said to be the largest building group in the world devoted to the handling of heating and plumbing supplies. These buildings, on Lake and Fulton St., cover two entire city blocks and consist of three units, averaging four floors and basement. One of these buildings will house the radiator plant and the brass shop. The second will contain the stock of plumbing supplies, while the third will be entirely devoted to pipe storage, cutting and threading. One entire floor will be required for office space. The new plant has ideal shipping facilities, including rail sidings, with arrangements for handling twelve cars at a time. This is the fifth physical expansion of the company in its forty-seven years of business.

New Home of James B. Clow & Sons, Chicago

Air in Capital Being Tested

An epidemic of pneumonia in Washington, marked by a sharply rising death rate, has caused officials of the Federal and city governments to order an inspection of ventilating systems in all public places, according to newspaper reports. In addition Government scientists are making laboratory tests of the air in the Capitol and other government buildings.

Samples of air are being collected from the Senate and House galleries and from other points in the Capitol. This is accomplished by opening both ends of a cylinder, passing it through the air and then sealing it. Similar work, it is stated, is being done in several of the large department buildings.

A special inspection of the ventilating systems in all theatres, halls and department stores has been ordered by the local health authorities. Air samples are not being taken in theatres and other places which already have approved ventilating systems. It is the opinion of city officers that the systems are ample if they are working properly.

CoKal Stoker Corporation Holds Convention

A sales and engineering convention of the CoKal Stoker corporation, of Chicago, held in the Wrigley Building, Chicago, December 10-12, was attended by 42 CoKal representatives. The convention was devoted to the company's sales and engineering problems. Among the interesting papers presented were two in which the complete design was worked out for a hypothetical 250-H.P. return-tubular boiler and for a 500-H.P. water-tube boiler, where the facts known were the characteristics of the load and the coal to be burned, the average capacity required and the approximate overload capacity for two hours.

A symposium was presented on the burning of wood refuse in conjunction with coal and the methods which the company has successfully evolved automatically to burn coal and wood together, alternately, or singly, on CoKal stokers.

President G. A. Kohout stated that the year 1925 was the largest in volume of business in the company's history. He pointed out, further, that the rapid use of oil fuel, on the one hand, and the rapid adoption of powdered coal for the larger plants, on the other, have brought about a very unique situation in regard to CoKal stokers that has widened their market enormously, strengthened the company's selling policy very materially and created a greater demand for CoKal stokers than ever before.

Present Accepted Practice in Domestic Oil Burners

16. Wayne. ***Atomizing, Mechanical Draft, Fuel Feed by Pump from Supply Tank to Sump Chamber. Atomizing Under Pump Pressure Through Stationary Nozzle. Electric Ignition by Expanding Gas Port.***

17. May. ***Atomizing Mechanical Draft. Fuel Feed by Pump from Supply Tank, with Pump Return of Excess. Atomization Under Pump Pressure. Electric Ignition by Expanding Gas Pilot.***

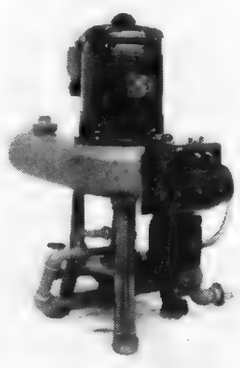
Previous articles in this series are: July, 1925,—1. Kleen Heet, 2. Baker, 3. Kerrihard; August, 1925,—4. Silent Glow, 5. Aetna; September, 1925—6. Caloroil, 7. Oil-O-Matic; October, 1925,—8. Chalmers; 9. Hart, 10. Sun; November, 1925,—11. Rayfield, 12. A, B, C.; December, 1925—13. Electrol. January, 1926.—14. Grant. 15. Nu-Way.

16. Wayne

REVEALING in its design the previous mechanical developments of its manufacturer, the Wayne oil burner, built by the Wayne Tank and Pump Company, Fort Wayne, is characterized mainly by the use of an oversize vertically-mounted electric motor driving a set of gear oil pumps and a fan. The motor is rated at exceptionally low speeds, in the various sizes, averaging 1200 r. p. m. The oil pumps, three in number, are mounted in a vertical line below the motor, each connected to the one above through a flexible coupling.

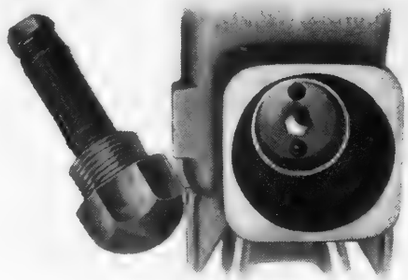
Briefly, one pump draws oil from the storage tank, delivering it to an oil-well base, housing the pump assembly, and a second pump returns surplus oil to the tank, maintaining a constant level in the base. Of course this pump has a greater capacity than the first. The third pump delivers the oil under pressure to the firing nozzle, where it is atomized by virtue of the pressure, which is in the order of 90 lbs. per square inch.

The firing nozzle is mounted in a casing that is introduced through the ash door of the boiler. Air delivered by the fan, in sufficient volume for proper combustion, but at low pressure, is introduced around the conical jet of atomized fuel. The low velocity of the incoming air results in almost noiseless combustion.



Wayne Oil Burner

Wayne Combustion Tube and Nozzle Holder



Wayne Atomizing Nozzle

Honeywell controls are used, a program motor-switch controlling, in proper sequence, the functioning of the burner. A standard Honeywell stack combustion safety control operates in the motor circuit to cut off the motor in case of ignition failure. The water level in the boiler is safeguarded by an interconnected Aquastat, Pressurestat or Vaporstat. A further provision for safety is an electric trip-switch in the main motor circuit, actuated by any accumulation of oil, from a drip pan set in the ash-pit, filling a chamber of the switch.

The burner unit proper, which is an exceptionally rugged assembly, is set well back from the front of the boiler, to which it is connected by an air-blast tube of flexible, seamless metallic tubing, about 4 in. in diameter. A smaller flexible pipe carries the fuel to the firing nozzle, and a third flexible connects the gas control-valve to the gas-pilot nozzle.

A heavy casting designated the combustion tube is bolted to the ash-pit door, the portion projecting inside terminating in a nozzle about 4 in. in diameter, in the axis of which the firing nozzle is fixed. The method of attaching the firing nozzle and making provision for its easy removal for replacement or cleaning is unique. The holder for the nozzle forms a sort of breech-block in the rear of the combustion tube, swinging downward on heavy trunnion hinges, one of which carries the fuel line, and the other the gas line. When this block is opened, the firing nozzle can easily be removed with a socket wrench. An observation port permits a view of the flame for the purpose of adjustment.

Two gas pilot flames are located on either side of the firing nozzle, recessed so that they cannot be blown out by air movement. A magnetic gas-control valve, actuated by the Honeywell control motor, increases the flow of gas to these nozzles when the burner is in operation, practically precluding ignition failure.

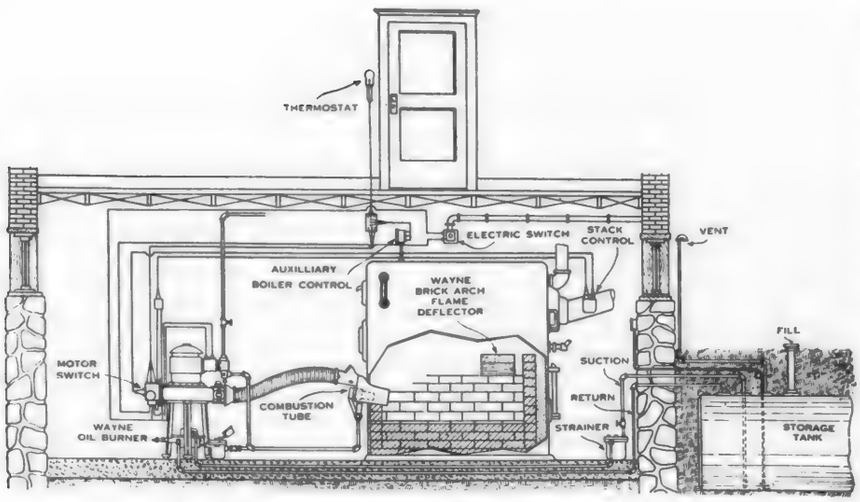
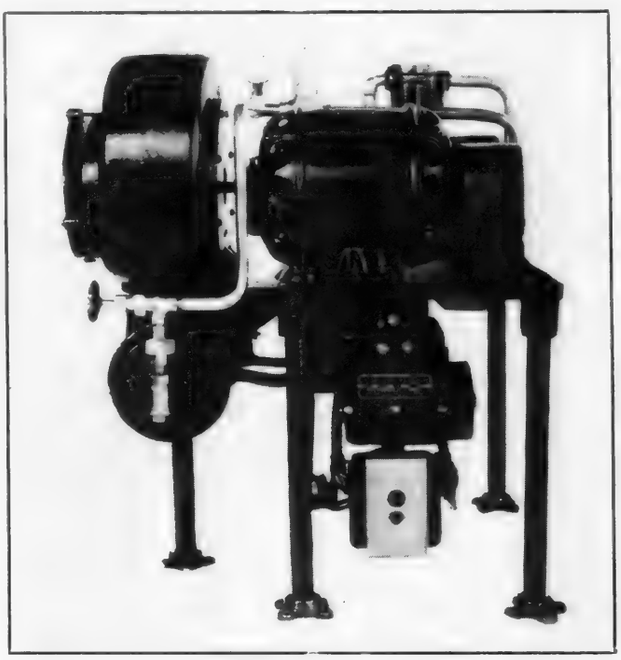


Diagram of Typical Wayne Installation

Control of burner capacity is exceptionally flexible. Different sizes of nozzles are available to fit various requirements. With a nozzle in place, of approximately the proper capacity, the flow of oil is variable through the medium of a relief valve, allowing a change in the oil pressure from 80 lbs. to 100 lbs. The air volume is controlled through a butterfly valve in the fan outlet housing.

The Wayne burner is rated in three blower sizes, and eight nozzle sizes, making combinations capable of handling from 400 to 7500 sq. ft. of connected radiation. This model W burner is listed by the underwriters for distillate or gas oil not heavier than 32° A. P. I. and is passed by the New York Board of Standards and Appeals.

The functioning of the burner is simple. Oil is drawn from the fuel tank by a Viking rotary-piston gear pump, which is belted to a pulley on one end of the motor. Before reaching the pump, the oil passes through a large primary strainer. From the pump, oil flows to a Y, on one branch of which is a spring-loaded check-valve, which prevents oil dribbling from the fuel nozzle. On the other branch of the Y is a spring loaded relief valve, which is set to return the surplus oil to the tank. A pressure gage is provided so that the pressure on the nozzle, which is responsible for atomization of the oil, may be set at the proper amount for the nozzle used and the heating load to be handled. From the check-valve, oil is passed through a secondary strainer, with a 150-mesh screen, to protect the nozzle, and thence through a brass pipe in the axis of the blast tube, to the nozzle.



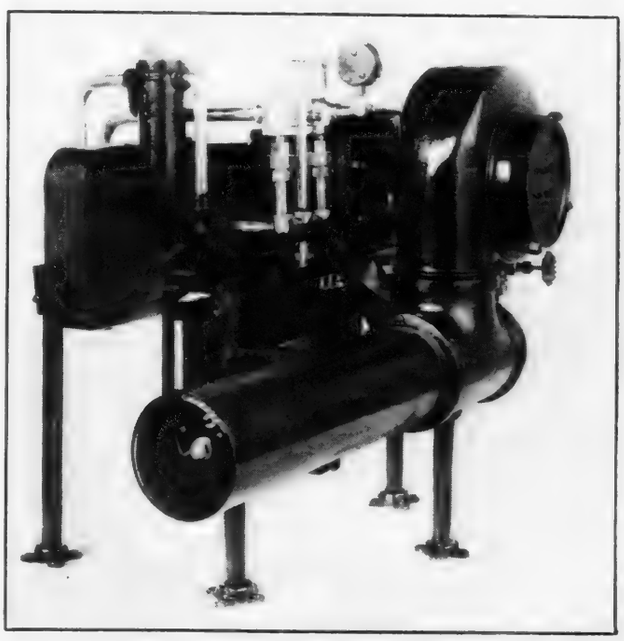
May Oil Burner— Rear View

17. May

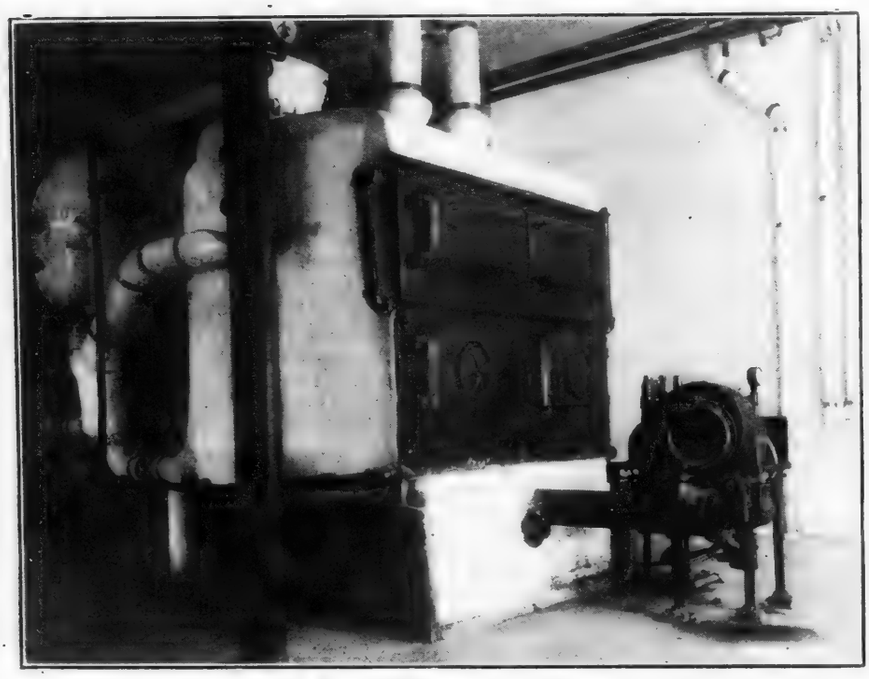
An entirely new idea has been incorporated in the design and fabrication of the domestic oil burner, manufactured by the May Oil Burner Corporation, Baltimore, Md.

As evidenced by the available oil burner literature, all of the other burners are composed of elements designed only for that particular burner, and any replacement, for wear or breakage, must come from the oil burner factory.

The May idea is based on the use of nationally known parts, stocked in nearly all of the important cities, many of them being available in any community where there is a heating contractor or plumber. Thus we find a piece of 4 in. iron pipe used as a blast tube; a standard speed Century motor; American Blower Co. Sirocco fan; strainers and valves of standard Lunkenheimer pattern; all these connected by standard brass pipe and fittings. There is even used, for an air chamber to prevent pulsation of oil, a capped length of brass pipe instead of a specially designed fitting. The idea back of this plan is that burners may be sold over widely distributed territory without the necessity of maintaining stocks of replacement parts.



May Oil Burner— Front View



A May Oil Burner Installation

The atomizing nozzle is a miniature copy of a type well developed through years of use in the U. S. Navy, and consists essentially of four milled slots, tangential to a small circular cup forming the outlet for the oil. By varying the section of these channels, and by using proper pressures on the oil, a wide range of capability, from 400 sq. ft. to 7000 sq. ft. of steam radiation may be handled with two burner sizes.

The air from the blast-tube is admitted to the combustion chamber in a cone surrounding the cone of atomized oil, and is given a whirling motion by a set of fixed vanes in the end of the blast tube.

Ignition is by direct electric spark just above the zone of atomized oil, functioning only during the starting period, a transformer of special design being used.

A complete Honeywell control, type D. S. S. motor, with combustion (stack) safety control, is used, the stack safety operating to cut off the motor if the oil is not ignited in 45 seconds. This safety control is interlocked with the room thermostat and a Honeywell boiler or furnace protection device.

The component parts of the burner are attached to a cast-iron bed plate, which is provided with adjustable legs.

The May burner is listed by the Underwriters Laboratories, for fuel not heavier than 36° A. P. I. and is approved by the Board of Standard and Appeals of New York City.

Propaganda on Window Ventilation

Items appearing in various newspapers in the Far West signed by Dr. C. E. A. Winslow, indicate that the views of the window-ventilation advocates are being exploited by the Gorgas Memorial Institute of Chicago. In one paper this matter is appearing under the general heading of "Better Health, Longer Life."

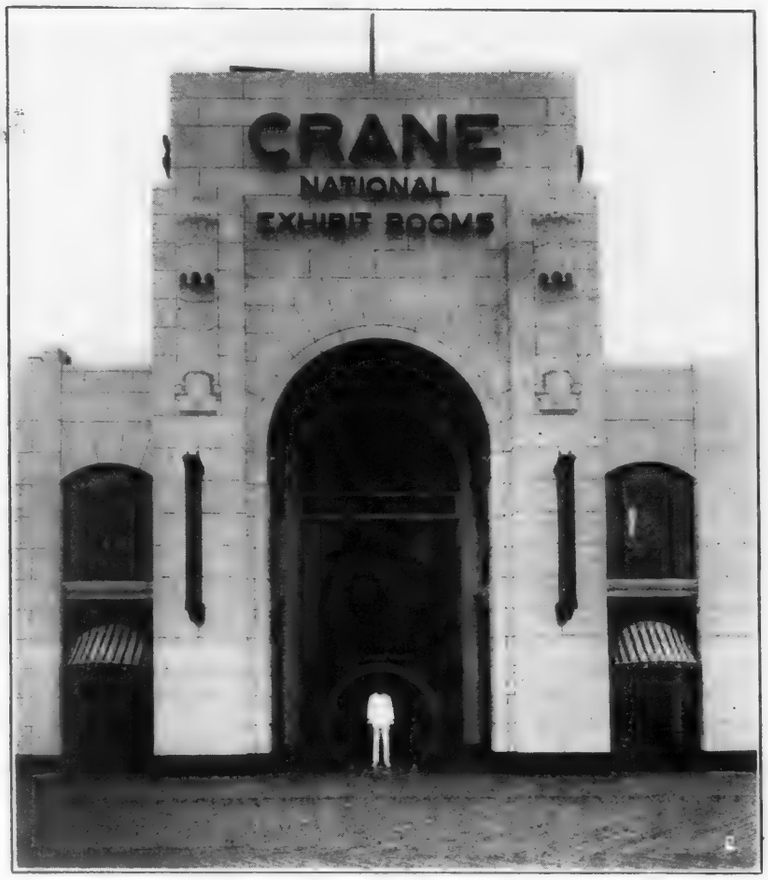
Deaths

Captain H. Riall Sankey, a well-known British consulting engineer, and past-president of the Institution of Mechanical Engineers, died suddenly in October, at his home in Ealing, England. Mr. Sankey was born in Tipperary, Ireland, in 1853, and was educated in Switzerland and at Woolwich. He entered the Royal Military Academy, receiving a commission in 1873, after which he went to the School of Military Engineering at Chatham. During his studies at this school he was associated with the well known series of train tests of automatic brakes, made on the railway between Newark and Nottingham, in which the Westinghouse system proved its superiority. Mr. Sankey was responsible for important military construction work at Gibraltar, following which he came to Kingston, Canada, as instructor in military engineering. While a resident in Canada, he wrote a text-book on electricity which led to his appointment to do research work at Southampton, in the making of electrotypes for the printing of ordnance maps. In 1889 Captain Sankey became associated with Willans and Robinson, well-known engine builders. During the fifteen years in which he was connected with this concern Captain Sankey was responsible for a number of important inventions in steam engine and turbine design. After the death of Mr. Willans in 1904, Captain Sankey resigned from the Willans and Robinson Company, and later joined the Marconi Wireless Telegraph Company, as consulting engineer and director, which position he held until the time of his death. During the war, Captain Sankey acted as engineering advisor to the Director of Fortifications and Works. Captain Sankey has been a member of the Institution of Mechanical Engineers for thirty years, and for fifteen years, has been a member of the Council. He held the chair as president in 1920 and 1921. Captain Sankey has also been vitally interested in the development of the Junior Institution of Engineers and the Institution of Civil Engineers, of which he has been a member for nearly thirty years. Since 1911 he has been a member of the American Society of Mechanical Engineers. The passing of Captain Sankey will be keenly felt in British engineering circles, as he has long been a dominating and virile figure.

Joseph F. Musselman, a prominent heating and ventilating engineer of New York, recently passed away at his home in Bronxville, following an attack of pneumonia. Mr. Musselman was a graduate of the University of Kentucky, and since coming to New York, has specialized in heating and ventilating work. He was responsible for the heating and ventilating arrangements in the Architects' Building, 101 Park Avenue, New York, in which he had his offices, the Pennsylvania State Capitol at Harrisburg, the Bank of Manhattan Building, New York, the Mayflower Hotel in Washington and the Statler Hotel in Buffalo, as well as the Grasslands Hospital in Westchester County. Mr. Musselman was a member of the Engineers' Club, the American Society of Heating and Ventilating Engineers, and was secretary of the Society of Consulting Engineers. He was also a trustee of the Bronxville Club. He is survived by a wife and son of eleven years.

Angus I. Campbell, president of the Campbell Heating Co., Des Moines, Ia., and known as a pioneer of Iowa, died at his home in that city, January 10. He was 91 years old. Mr. Campbell was trained as a printer and publisher. His hobby, however, was heating and ventilation and he designed and patented what was then known as the circulatory method of heating. This invention led to his embarking in the manufacture of heating apparatus. Moving to Des Moines in 1886 be became the head of the Campbell Heating Company and continued in that capacity up to the time of his death. He leaves a widow, six sons and three daughters. One of his sons is Everett K. Campbell, president of the E. K. Campbell Heating Company, of Kansas City, Mo.

Mr. Campbell is credited with having introduced three important ideas to the warm-air heating industry. Two of these were covered by patents after the patent office had investigated his applications for three years. His most important idea was an apparatus providing for the recirculation of air, which, after 45 years, has only recently become accepted practice. His two patents cover a device for moistening the air supplied by a warm-air furnace, and the use of steel in warm-air furnace construction.



Crane National Exhibit Rooms, Boardwalk, Atlantic City

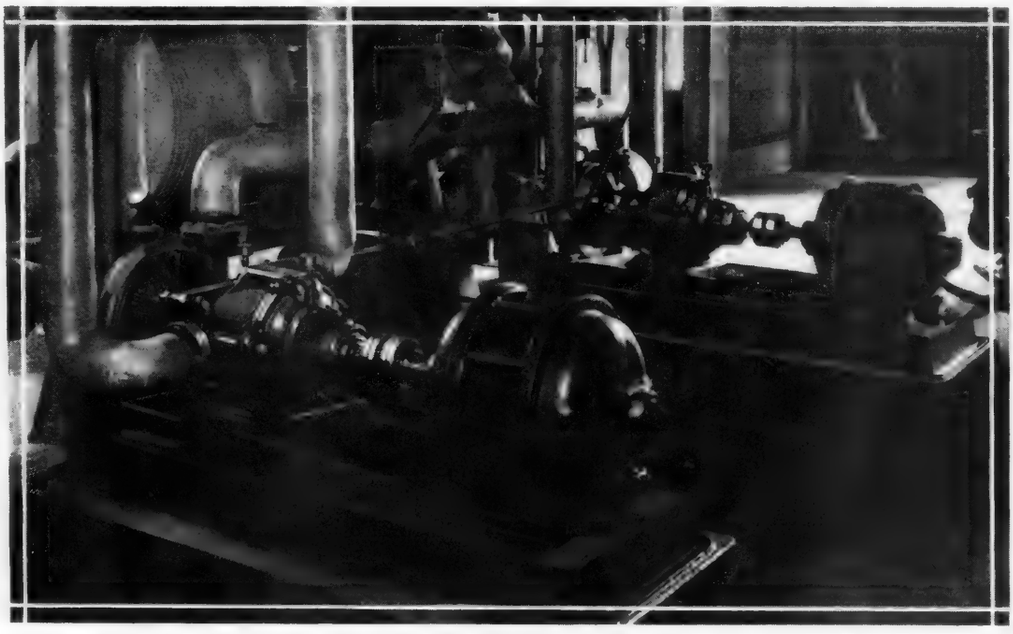
Crane Co.'s Atlantic City Exhibit Rooms

The accompanying views show the exterior and glimpses of the interior of the Crane National Exhibit Rooms, recently completed on the Boardwalk in Atlantic City. This building has attracted national interest and typifies one of the most complete exhibits of its kind in the country. A colossal gate valve, which forms the entrance to the building, is perhaps the most conspicuous feature of the building. This valve weighs 20 tons and many who attended the mid-summer meeting of the American Society of Heating and Ventilating Engineers, in Atlantic City last summer, will recall the difficulty and the amount of effort required to set the valve in place.

The views here reproduced include an interesting exhibit of the largest and smallest size of industrial pipe furnished by Crane Company, from a steel pipe 7 ft. in diameter to a tube ⅛ in. in diameter. These exhibits are only a few of those embraced in the company's extensive line shown in other portions of the exhibit rooms.

Boiler and Radiator Display, Crane National Exhibit Rooms

Pipe and Valve Exhibit, Crane National Exhibit Rooms



View showing two of the six motor-driven Jennings Hytors installed at the U. S. Army Supply Base, 58th St. & 1st Ave., Brooklyn, N. Y.

Six years in the army—good for many more

Ever since the six Jennings Hytors at the U. S. Army Supply Base, Brooklyn, were installed six years ago, they have served steadily without necessitating a single expense for repairs.

Not a bit of attention has been required other than lubrication and packing.

Such performance is characteristic of Jennings Hytors the country over. If you are not familiar with these remarkable heating pumps, let us send you copies of our bulletins. They contain Hytor information you would want to know before designing your next heating system.

NASH ENGINEERING COMPANY

SO. NORWALK CONNECTICUT

Branch Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Washington. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, England, Norman Engineering Co.; Brussels, Belgium and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Hytor

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Coming Events

February 20-27, 1926.—New York's eighth annual "Own-Your-Home" exposition, Madison Square Garden, New York.

March 17-23,1926.—First national heating and ventilating exposition, Madison Square Garden, New York.

March 27-April 3, 1926.—Chicago's sixth annual "Own-Your-Home" exposition, in the Coliseum, Chicago.

April 6-8, 1926.—Third annual convention and exposition of the American Oil Burner Association, in Detroit, Mich. Headquarters at the Book-Cadillac Hotel.

April 14-15, 1926.—Annual convention of the National Warm-Air Heating and Ventilating Association,, in St. Louis, Mo.

June 1-3, 1926.—Seventeenth annual convention of the National District Heating Association, at Niagara Falls, N. Y. Headquarters at the Niagara Hotel.

June 1-4, 1926.—Thirty-seventh annual convention of the Heating and Piping Contractors National Association, at Washington, D. C. Headquarters at the Willard Hotel.

June 22-24, 1926.—Forty-fourth annual convention of the National Association of Master Plumbers, at Louisville, Ky. Headquarters at the Brown Hotel.

Miscellaneous Notes

National Association of Plumbing and Heating Salesmen will hold its first annual convention in Detroit, May 27-29.

Central Supply Association is distributing copies of Referendum No. 47 of the Chamber of Commerce of the United States, proposed to secure the opinion of interested parties on the Kelly-Capper Bill, designed to regulate resale prices. The association reports that this proposed legislation meets with the approval of the majority of its members which has returned ballots.

Detroit Steamfitters Protective Association has authorized Robert Wright to organize educational meetings for journeymen steamfitters. Classes and lectures will alternate, and the speakers will be drawn from beyond the ranks of the association. An apprentice class will also be started at the Cass Technical High School.

National Distribution Conference, held under the auspices of the Chamber of Commerce of the United States, has issued the report of its Committee IV, entitled "Expenses of Doing Business." This is one of six phases of industry under investigation, and the report contains the analysis of a tremendous amount of pertinent data. Among the primary subjects treated, with tabulated data and charts, are: retail expenses; wholesale expenses; manufacturer's distribution costs; cost of warehousing; credit and the cost failures; effect of simplification and turnover on the cost of distribution.

Heating and Piping Contractors Chicago Association has elected the following officers for the coming year: President, Ralph Barnes; vice-president, W. A. Burne; treasurer, Harry Mitchell; secretary, George H. Dahlquist. The officers report that the association, which was formed a year ago, has been improving its position steadily among the heating fraternity. The association's "Guarantee Heating" certificate has proved highly successful in obtaining the confidence of local owners and builders.

Heating and Piping Contractors New York State Association will hold its annual meeting in Utica, N. Y., March 29. Headquarters will be at the Hotel

The Capitol Theatre—Chicago

JOHN EBERSON—CHICAGO
Architect

B. F. REYNOLDS & CO.—CHICAGO
Heating & Ventilating

Quiet, dependable propeller fans, Uniblade Blowers and Unit Heaters make up the Autovent line. It will pay you to learn more about it. Write us for catalog data and prices!

Stars Twinkling— and the Air *Fresh!*

TINY, twinkling stars overhead; clouds floating by; the air sweet and pure!

Such is the unique impression created as you admire the beauty of the new Capitol Theatre, Chicago.

How quickly the spell would be broken if the air was bad! Only because of the steady, dependable performance of Autovent Uniblade Blowers is this beautiful interior a lasting success.

It is gratifying to note the increasing favor with which Architects, Engineers and Contractors look upon Autovent products.

The full co-operation of our Engineering Department is yours for the asking. Make use of it—often!

AUTOVENT FAN & BLOWER COMPANY

730-738 W. Monroe Street **CHICAGO**

Marten. Utica is the home city of President Paul W. Schneider of the association. These meetings are always looked forward to by those most active in the industry. This year's meeting will mark the thirtieth anniversary of the New York State association.

New York.—Journeymen steam fitters in New York City are demanding an increase of $1.50 per day in their wages, which has been refused by the employers. The matter was considered by the executive committee of the board of governors of the Building Trades Employers' Association, when it was proposed that the demands of the journeymen be submitted to arbitration. This was agreed to by the journeymen and sub-committees were appointed to formulate the arbitration proposal. An impasse, however, was experienced at the outset through the demand, on the part of the union, that the increase be granted pending the arbitration.

Department of Plumbing, Heating and Ventilation, of Carnegie Institute, Pittsburgh, has inaugurated a special night course in accounting and bookkeeping, as applied to the plumbing and heating industries. This course started the first week in January and will continue until the last week of April. The schedule calls for one night a week. Adult applications have already been received to schedule four separate classes.

Research Required in the Heating and Ventilating Industry was the subject of a lecture by Professor S. E. Dibble at the recent three-day Institute in Plumbing, Heating and Ventilation, held at Carnegie Institute of Technology. Professor Dibble was very emphatic on the necessity for research, especially in regard to the best method of boiler rating. Professor Dibble pointed out the fact that the weight of a boiler, or its external dimensions, could not be accepted as a unit of measurement of its heating capacity and that until this subject was thoroughly thrashed out and settled upon, no universally satisfactory unit could be used. In the opinion of Professor Dibble, the important point in the rating of boilers is the chimney factor, or combustion rate.

Detroit Steam Fitters' Protective Association has authorized Robert Wright to proceed with the development of educational meetings for steam fitters. A course of instruction and a series of lectures is planned, under the direction of one of the journeymen. Representatives of manufacturing concerns, and others qualified, will be invited to address the classes. Provision is also being made for a steam fitters' apprentice class at the Cass Technical High School.

Manufacturers' Notes

Foxboro Co., Inc., Foxboro, Mass, announces the removal of its Pittsburgh office to the Foxboro Building, Sixth Avenue and Grand Street. The four upper floors of this new building will be devoted to stock rooms and offices. H. S. Gray will continue in charge of this branch.

Gorton & Lidgerwood Co., New York, has removed its San Francisco office to 1061 Howard Street; Frank E. Witte is the manager of this branch.

Griscom-Russell Company, New York, has located its general offices in the new Murray Hill Building, Madison Ave. and Fortieth Street.

Ric-Wil Co., Cleveland, O., manufacturer of Ric-Wil underground conduit, has opened a New York branch office, under the management of C. W. Lemmerman, of Cleveland. Mr. Lemmerman was formerly manager of the contract department of the Keasbey & Mattison Company and previous to that was connected with Johns-Manville, Inc.

Pierce, Butler & Pierce Mfg. Corp., New York, announces that William T. Hannegan, recently on the staff of *The Plumbers' Trade Journal*, has joined their general sales force.

Super Heating Corp., Milwaukee, Wis., is the new name of the former Round Oak Summer Heat Oil Burner Corporation of Wisconsin.

Trane Company, La Crosse, Wis, will soon start work on two new additions; a one-story section, 70 x 115 ft. and a two-story addition, 33 x 109 ft. This increase will be used mainly for storeroom purposes.

SAN JOAQUIN LIGHT & POWER COMPANY

Fresno, Calif.

R. F. Felchin
Architect

Hunter & Hudson
Engineers

U. S. CONTROLLED OZONIZERS

are adding to the comfort of the occupants of this building while paying an annual dividend to the owners through the saving of heat and refrigeration accomplished by recirculation of the air.

Purifying 120,000 CFM.

MONTGOMERY BROTHERS

Chicago
500 No. Dearborn St.

San Francisco
61 Fremont St.

New York
50 Church St.

General Sales Agents for

THE UNITED STATES OZONE COMPANY

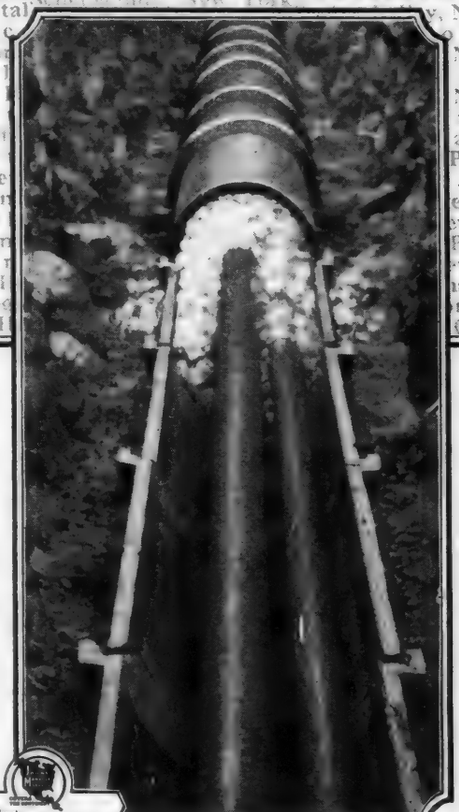
General Offices and Laboratories: 500 No. Dearborn St., Chicago
Factory: Scottdale, Penna.

A FEW USERS OF THE JOHNS-MANVILLE UNDERGROUND SYSTEM OF INSULATION

It saved 330 more tons of coal than estimated

OUR usual guarantee of 90% efficiency went with the 19,400 feet of Johns-Manville Underground System of Insulation at Cornell University.

Thirteen months after installation, efficiency was tested and found to be 92.77%, indicating a yearly saving of *330 tons of coal over the estimate.*



JOHNS-MANVILLE INC., 292 Madison Ave., at 41st St., N. Y. C.
Branches in 63 Large Cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto.

JOHNS-MANVILLE

Underground System of Insulation

Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

The insulating material which surrounds the pipes is Johns-Manville Asbesto-Sponge Filling—the most durable and efficient for underground work.

Continental Heater Corporation, Dunkirk, N. Y., is adding a concrete building 160 x 200 ft., of saw-tooth roof construction to its machine shop.

Fulton Company, Knoxville, Tenn. has distributed to its employees insurance certificates aggregating one-half million dollars. Each employee in the service of the company for six months or more is insured for $1000; in addition to the life insurance, a disability clause is included, establishing a fixed income in case of total incapacity on the part of the employee.

Vinco Company, Inc. New York City, announces the election of C. W. Stewart as vice-president and general manager. For several years Mr. Stewart has been president of the Haynes Selling Company, Philadelphia, and has been an active member of the Philadelphia Chapter of the A. S. H. & V. E.

Abram Cox Stove Co., Philadelphia, announces that the New York branch of the company, formerly located at 113 East 34th St., has been removed to 51 East 42nd St., where a complete line of heating apparatus will be displayed.

Hart & Crouse Co. of Utica, N. Y. has opened a new branch office in St. Louis in charge of Frank Prade.

Tenth Anniversary of the Sterling Engineering Company

A significant "mile post" was reached by the Sterling Engineering Company, of Milwaukee, Wis., manufacturer of the Sterlco line of heating specialties when the company celebrated its tenth anniversary.

MANUFACTURED WEATHER
makes
"Every day a *good* day"
Humidification · Dehumidification
Heating · Ventilation · Purification
Drying
Carrier
Engineering Corporation
750 Frelinghuysen Ave. Newark, N. J.
Boston Buffalo Chicago New York Philadelphia Los Angeles
SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE

TWINFAN Unit Heaters

Where Would YOU Put Radiators?

IF you had to heat this plant by direct radiation, where would you install the radiators?

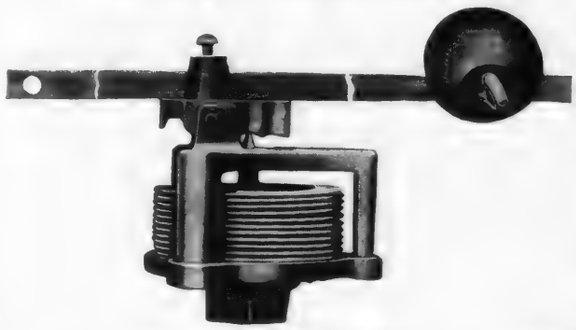
Not much chance to find a place that doesn't interfere with the operation of the plant except on the ceiling. You know what that location means in heat wasted.

The TwinFan Unit is easily suspended over the door out of the way where it can heat this section of the building comfortably and economically. The TwinFan can be adapted to almost any plant where floor space is at a premium. The case of the TwinFan never becomes too warm to lay the face against, so it can be located immediately adjacent to work benches, machine tools, etc. When necessary it can always be supported by brackets from columns or wall, or suspended from the ceiling.

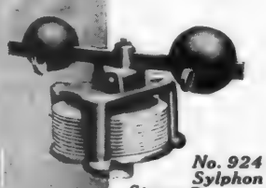
Convenience and heating efficiency recommend the TwinFan to industrial customers. The ease of installation and low cost of labor for a TwinFan job recommend it strongly to contractors. May we help you sell a TwinFan on your next industrial heating inquiry?

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

These 31 leading Boilers are Standard Equipped with Sylphon Damper Regulators



No. 22—Sylphon Damper Regulator for low pressure steam boilers

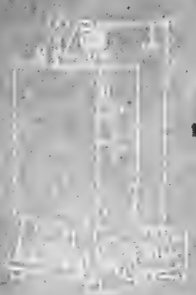


No. 924 Sylphon Steam Damper Regulator, extra sensitive type

No. 45-A Sylphon Hot-Water Damper Regulator

Abendroth	Keystone
Ames	Kewanee
Birchfield	L-O
B-Line	Novelty
Burnham	National
Coil	Oil City
Coatesville	Otis-Sawyer-Economy
Congress	Pierce-Pebco
Fitzgibbons-Ontario	Richardson
Floral City	Richmond
Freed	Ross
Heggie-Simplex	Senate
Imperial	Star
International Economy	Standard
Keysco	Thatcher
	West Coast

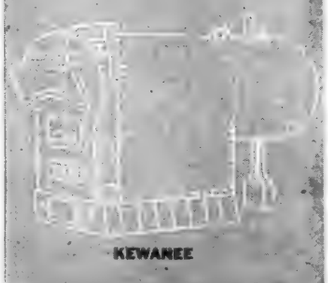
NOVELTY



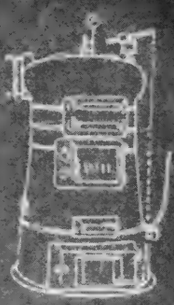
B-LINE

FLORAL CITY

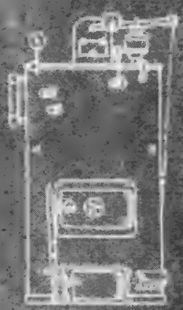
HEGGIE-SIMPLEX



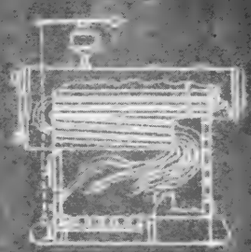
KEWANEE



FREED

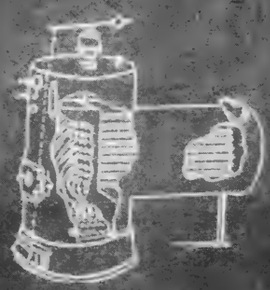


COIL



WEST COAST

ABENDROTH



FITZGIBBONS ONTARIO

EVEN HEATING AND FUEL SAVING

That's what you'll get if you install boilers equipped with Sylphon Damper Regulators, because these regulators all contain as their diaphragm the everlastingly flexible, all-metal, Sylphon bellows. Drawn and formed seamless from a flat sheet of specially prepared metal, it is the most sensitive, flexible and durable diaphragm known.

Sylphon Damper Regulators last as long as the boiler. They can be installed on any make of boiler—but be sure you get the genuine—made only by The Fulton Company.

Ask for Bulletin WDR-5

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL-SEAMLESS SYLPHON BELLOWS
Sylphon

THE FULTON COMPANY

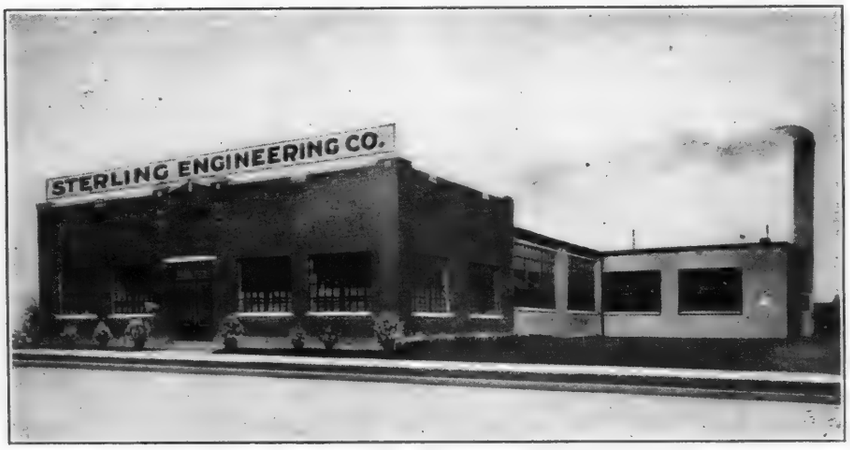
KNOXVILLE, TENN.

ORIGINATORS AND PATENTEES OF THE SYLPHON BELLOWS

Sales Offices in: New York, Chicago, Detroit, Boston, Philadelphia, and in all principal cities in U. S.

European Representatives: Crosby Valve & Engineering Co. Ltd., 41-42 Foley Street, London, W. 1, England.

Canadian Representatives: Darling Brothers, Ltd., 120 Prince Street, Montreal, Canada.



New Plant of the Sterling Engineering Company

The firm was incorporated in 1916. Two years later C. J. Rice, who is now president, became interested in the company and took active charge of the business. During the intervening years the company has enjoyed a steady growth. Its rented quarters finally became overcrowded and the firm decided to build its own plant. The new structure is shown in the accompanying illustration. Evidence that the company's judgment was sound in carrying out the plans for its expansion is furnished in the statement by President Rice that the year just closed showed the largest volume of business in its history.

New Incorporations

Parkman-Wasgatt Co., Inc., Lexington, Mass., capital $50,000, to manufacture oil burners and electrical refrigeration appliances for domestic purposes. Incorporators: William C. Griffin, Boston; Dorothy S. McCabe, Lexington, and Margaret F. Mahoney, North Billerica, Mass.

Samuel Galucci & Sons, New York, incorporated to take over partnership of the same name. Capital $20,000. Incorporators: S. and T. and V. Galucci.

Triangle Heating Co., Brooklyn, N. Y., capital $20,000.

Clark Heating & Plumbing Co., Manchester, Conn., Capital $50,000. John Clark, Manchester, president.

Bergen Plumbing Co., Ridgewood, N. J., capital $20,000, will do a heating and

STEAM TRAPS
AIR TRAPS
STEAM SEPARATORS
EXHAUST HEADS
OIL SEPARATORS
BOILER ALARM WATER COLUMNS
STRAINERS

WRIGHT AUSTIN

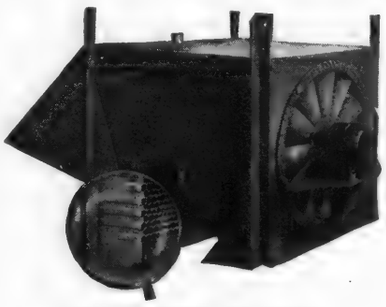
WRIGHT-AUSTIN CO.
DETROIT, MICHIGAN

WHY LET THAT UNHEATED BUILDING WORRY YOU

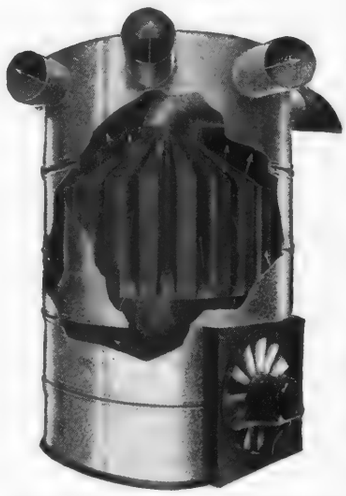
We manufacture Unit Heaters and Fan Heating Systems for every need. If steam is not available, our all steel direct fired Fan Furnace will meet your requirements.

Send us your heating problems and we will show you the easiest and cheapest way.

Recommendations and prices furnished cheerfully without cost to you.



COMET UNIT HEATER
Suitable for use where steam and hot water is available. This Heating Ace is especially adapted where compactness and lightness in weight is of importance. For complete description write for Bulletin No. 85.



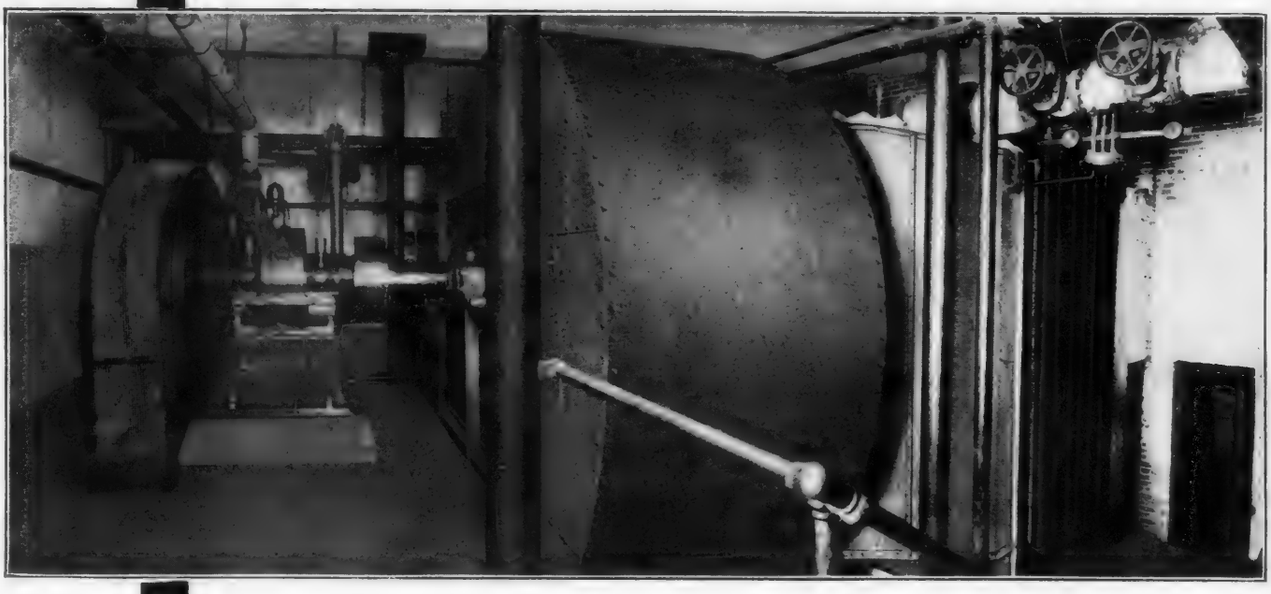
DIRECT FIRED FAN FURNACE
For use where steam or hot water is not available. For complete data write for Bulletin No. 90.

THE NEW YORK BLOWER COMPANY
CHICAGO, ILL. *Branch Offices in Principal Cities* LA PORTE, IND.

Service—at a Saving—

Not only can we serve you in all branches of heating and ventilating work—with fans and heater coils, unit heaters, direct-fired heaters, and complete ventilating systems which include air washer, but we can many times render this service at a decided saving over the cost of other equipment.

The users of the Buffalo Fan and Heater shown here say:



"By putting in this system we SAVED approximately $50,000 over what it would have cost to install a ———— system. The results obtained have been very satisfactory."

Catalogs on all Buffalo heating and ventilating equipment may be had on request.

Buffalo Forge Company

480 BROADWAY BUFFALO, N. Y.

"Buffalo" heating ventilating

plumbing business. A. Frederick Hall, president.

Chicago Pipethread Machine Co., Racine, Wis., to manufacture pipethreading machines. Incorporators: Charles Rasmussen and R. T. Ingalls of the Wisconsin Machinery Company, Racine; L. H. Taylor, formerly of the Greenfield Tap & Die Corporation, Greenfield, Mass., and Clifford Peterson of the Clifford Peterson Tool Company, Chicago.

Boston Caloroil Burner Co., Inc., Boston, Mass., capital $10,000, to manufacture oil burners. Incorporators: John B. Primrose, William E. Whitney, and Elmer H. Whitney.

Electric Steam Heating Co., Seattle, Wash., capital $150,000. Incorporators: W. J. Hedgecock, J. J. Wored and C. E. Cummins.

W. T. Branson, Inc., Charlotte, N. C., capital $100,000, to conduct a heating business. H. W. James, T. L. Disher, and W. T. Branson, incorporators.

A. Friedman Heating & Ventilating Co., New York, to conduct a general heating and ventilating contracting business. Incorporators: A. and D. Friedman.

United Plumbing & Heating Supply Co., Boston, Mass., capital $10,00. Incorporators: Oscar Price, Roy G. Wiggett, John D. Marks.

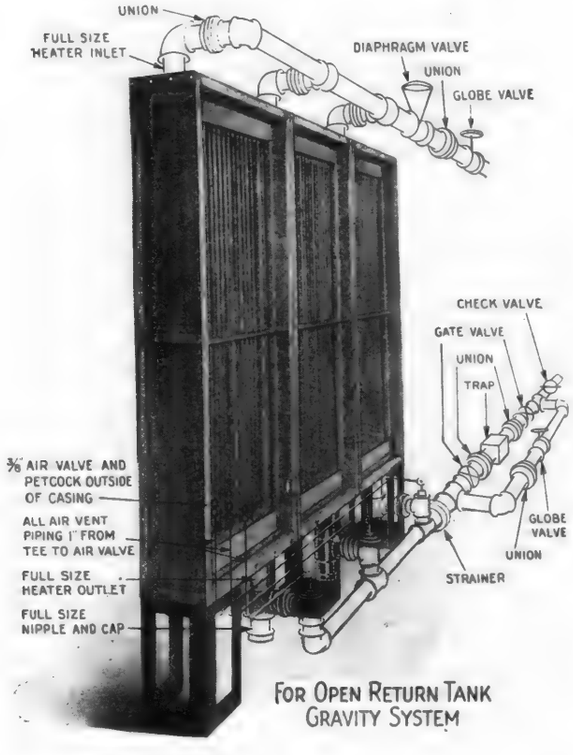
Harley Pipe and Supply Co.,, Los Angeles, Cal., capital $50,000. Incorporators: C. W. Bareen, J. R. Herley, F. E. Dowd, C. S. Head and H. A. Bareen.

Hoffman Specialty Company's Meeting in Chicago

Aetna Burner Distributors, Inc., Hartford, Conn., capital $50,000, to deal in heating apparatus. Incorporators: Herbert Spencer, Albert E. Binks and Edward J. Daly, all of Hartford, Conn.

Hoffman Specialty Company Entertains Chicago Heating Contractors

Signalizing an intensive campaign to "vacuumize" Chicago, the Hoffman Specialty Company was host to over 400 heating contractors at the Hotel Sherman, January 15. In explaining the plan, Frank H. Gaylord, Chicago manager, stated that a dominating advertising campaign would be conducted in the *Chicago Tribune* during the entire week beginning January 31, on which date a full page would list the name and address of every local contractor carrying a stock of Hoffman valves. A high-pressure drive by salesmen is designed to supplement the newspaper advertising, while window displays are planned for all parts of the city.



FOR OPEN RETURN TANK GRAVITY SYSTEM

AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.
L. C. Soule, *Sec'y and Sales Manager*

AEROFIN

Fan-System Heating Surface

To Engineers, Architects and Contractors

THREE YEARS OF SUCCESSFUL SERVICE demonstrates that AEROFIN has established itself as a dependable product.

ENGINEERS OF NATIONAL REPUTATION AND TWENTY YEARS' EXPERIENCE WITH FAN SYSTEM HEATERS, are responsible for the design, development, manufacture and marketing of AEROFIN, and their services are at your command to assist you in working out your heating, ventilating, cooling and drying problems.

SINCE THERE IS NO EQUAL TO AEROFIN, WHY NOT SPECIFY IT OUTRIGHT? Plans and specifications should show sizes and number of units, with piping details.

AEROFIN HAS A TREMENDOUS ADVANTAGE in its LIGHTWEIGHT. AEROFIN weighs only 9% to 25% as much as the old-fashioned heavy heaters. AEROFIN SAVES A GREAT DEAL OF SPACE.

AEROFIN IS MADE OF NON-CORROSIVE METALS. This feature meets with universal approval.

THE INSTALLED COST OF AEROFIN IS GENERALLY LESS than that of cast-iron heaters and pipe coils. AEROFIN (completely encased) can be erected in the same number of HOURS as is required in DAYS to erect the heavy heaters. This means a great saving in erecting cost.

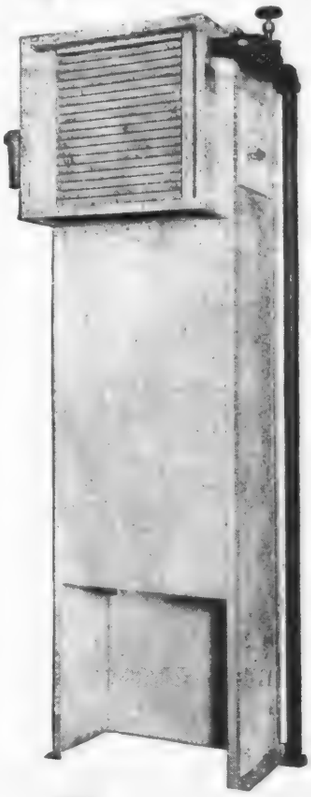
THE INSTALLATION OF AEROFIN WITH VERTICAL TUBES IS RECOMMENDED as this arrangement is less subject to errors of installation and operation. THE HORIZONTAL TUBE ARRANGEMENT is satisfactory when installed in accordance with our instructions and diagrams.

Write for catalog, instruction leaflet and service details.

Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

In what Other Heating Method can you get these amazing Advantages?

The Venturafin METHOD OF HEATING



1. More than 5 times the heating efficiency of direct radiation.
2. One-tenth the weight of direct radiation.
3. One-fourth the space of direct radiation.
4. Much less time to install than direct radiation.
5. Positive heat in the most severe weather.
6. Even distribution of heat.
7. The ability to heat up more quickly than direct radiation.
8. Adaptable to practically any position without loss of efficiency.
9. Considerably less heat loss through walls than direct radiation.
10. Low cost of installation.
11. Considerable saving in fuel.
12. The minimum of maintenance costs.
13. Copper and brass coils, non-corrosive, non-breakable.
14. Portability without great expense.
15. Ventilation as well as heating.
16. No alterations to install.
17. Applicable to practically any heating need without special construction of units.
18. Practically indestructible.
19. Simplicity.
20. Ease of control.

Write for Complete Data

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(464)

American Blower

"Sirocco" TRADE MARK

VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

Manufacturers of all Types of Air-Handling Equipment — Since 1881

Other speakers were: Guy Hutchinson, vice-president; C. V. Haynes, vice-president and M. A. Myram, of the *Chicago Tribune*. Following a general forum, a buffet supper was served.

Cleveland Office of National Air Filter Holds Banquet

A banquet and smoker for 175 of the leading engineering men of Cleveland and vicinity was staged by the Cleveland office of the National Air Filter Company in the Rainbow Room of the Winton Hotel, Cleveland, January 12. A special steak dinner was served accompanied with lively music by an orchestra from the Case School of Applied Sciences. The dinner was aranged by R. E. Bronson Company, district representatives of the National Air Filter Company.

Charles Milton Newcomb, acted as toastmaster. Brief talks were made by Messrs. Harpham and Birkholz of the National Air Filter Company and Mr. Bronson of the Cleveland office.

Dr. E. Vernon Hill was then introduced, his subject being "The Modern Aspect of Clean Air." Incidental to his talk, he showed by an actual demonstration how a dust determination test is made with the Hill dust counter. The meeting was then thrown open for general discussion and an inspection of the National rotary air filter, which was exhibited in the form of a machine in full working order.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

POSITION WANTED—Construction engineer and superintendent, thoroughly experienced in supervising, erecting and estimating heating and ventilating, power and industrial piping, desires permanent connection with a responsible concern in the East. Address Box 21, care Heating and Ventilating Magazine.

WANTED—State distributors for a well-known motor-driven, thermostatically oil burner for home heating. Address The Rota-Stat Burner Co., Wichita, Kas.

WANTED.—Heating and ventilating sales engineer familiar with the unit ventilating system. Want man who understands his business. Give full particulars as to ability and salary in first letter. Address Box 22, care Heating and Ventilating Magazine.

WANTED.—A mechanical engineer for heating and ventilating, high-pressure piping, to make plans and specifications, estimate, supervise. Fine opportunity for right man in a city of two hundred thousand, with a long-established firm. Position now vacant on account of death of former engineer. State age, experience, salary expected and give references. Address Box 23, care Heating and Ventilating Magazine.

"Readers Announcement"

Our Educational Service is being extended to readers of THE HEATING AND VENTILATING MAGAZINE. It is for Manufacturing and Contracting folks, as Employers, Draftsmen, Salesmen, Mechanics, Clerks, Apprentices, etc.

Since 1910 the St. Louis Technical Institute has taught quite an army of folks desiring to improve their opportunities. Our courses are Modern, Comprehensive and Official, and designed to give you those higher, finer touches your profession requires.

We Teach You In Your Own Home, Personal, Clear, Direct

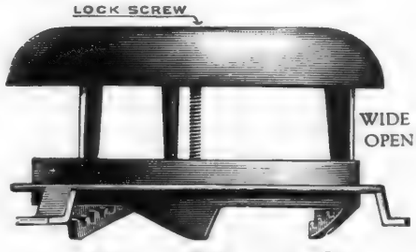
Our School Directory sent Free to interested parties. Indicate your Course when writing.

HEATING VENTILATING ENGINEERING
SPECIAL STEAM AND WATER HEATING
PLUMBING DESIGN AND INSTALLATION
WARM AIR HEATING
CONTRACTING AND ESTIMATING
MECHANICAL DRAFTING

Start with the 1925-26 School Season

ST. LOUIS TECHNICAL INSTITUTE
4541 Clayton Ave., St. Louis, Missouri

1926 IMPROVED MODEL



Nu-Notch
REG. U.S. PAT. OFF.

Mushroom Air Diffuser for Auditoriums

No Rim or Cap Obstructions

Easily adjusted to many regulations from wide open to completely closed.

Send for booklet showing details.

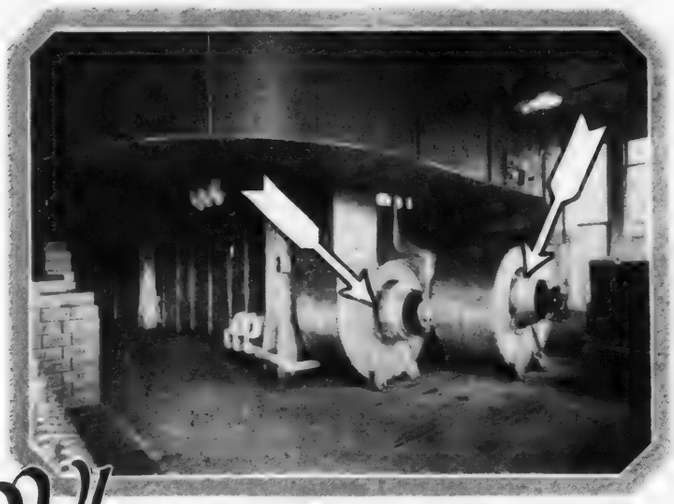
Knowles Mushroom Ventilator Co.
202 Franklin St. New York

DE BOTHEZAT
Disc Pressure Fans

Any Size — Pressure — or Volume

HIGH STATIC PRESSURE
HIGH EFFICIENCY

De Bothezat Engineering Corp.
1922 Park Avenue, NEW YORK CITY



Here's Why the Foremost Architects and Engineers Recommend Ilg Blowers

THE more you know about the fundamental details of blower construction and the basic principles of air delivery in volume, that much more will you appreciate the many exclusive features and refinements of ILG Direct Connected Blowers which are made, tested, sold and guaranteed as a complete unit under basic patents.

1 **Compact Design.** From the standpoint of compactness — economy of space, the ILG Direct Connected Blower is an innovation. The principal feature that makes for compactness is the built-in motor which is placed in the housing of the blower. Therefore, no extra pedestal or support of any kind is required.

2 **Housing.** The sides of the ILG Blower are made of cast iron with sheet steel scroll, put together with heavy duty cap screws, forming a rigid foundation for motor or bearing bracket. Both sides are alike making it easy to place motor on either side giving right or left hand drive.

3 **Simple Construction.** The ILG Direct Connected Blower is a notable example of simplicity in modern engineering. The construction and materials used are a departure in present day manufacturing, combining super-strength with minimum weight and unusual flexibility in placement and discharge.

4 **Ball Bearing Motor.** The ILG motor is distinctly an ILG product especially designed for blower drive by ILG engineers and made complete in the ILG factory according to the ILG standard. Each motor is tested with the blower on the same electrical current for which it is built and under actual load conditions.

5 **Dependable Efficiency.** The experienced engineer will recognize that the ILG Blower is built to secure the highest efficiency with reasonable quietness at highest speeds. It has the strength to withstand the stress and strain of heavy loads and can be relied upon to perform perfectly.

6 **Wheel.** The wheel used is a multi-blade type made of special Whiting ribbon steel. Blades are electrically welded — one piece steel retaining rings, hand forged spider and malleable iron hub. It is mounted on motor shaft — no bearings, no aligning, affording perfect balance and unobstructed inlet.

7 **Easy to Install.** The ILG Direct Connected Blower is completely assembled at the factory and placed on skids for shipment. After being rolled into place, the skids are knocked off, the four legs bolted down and the installation is complete. It can be changed on the job to right or left drive with any discharge.

8 **One Responsibitity.** The supreme feature of the ILG Direct Connected Blower is the one factory responsibitity. The ILG motor and blower are guaranteed as a complete unit. There's no split responsibility between the blower and motor manufacturer. We build under one roof a complete line of motor driven fans and blowers.

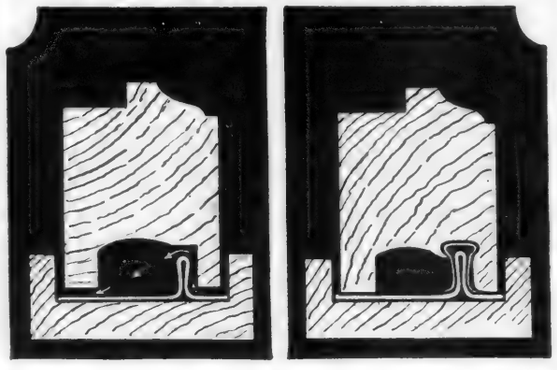
Send for 200 page loose leaf catalog which contains comprehensive information with engineering data, etc.

ILG ELECTRIC VENTILATING CO., 2858 North Crawford Avenue, CHICAGO, ILL.

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

Ventilation for Stores, Offices Factories, Public Buildings Restaurants, Theatres, Homes, etc.

HIGGIN ALL METAL WEATHER STRIPS



Ordinary single-member strip Sash grooved for cord

The exclusive Higgin Insert Strip completes the job

Are you recommending the right weather strips?

The only weatherstrips made with a self-holding spring-flange **Insert** are Higgin All-Metal Weatherstrips.

No window without this **Insert** can be as draft-tight as a Higgin-equipped window. The illustration shows why.

The spring flanges of the **Insert** lightly grip the sides of the raised rib and close the space around the sash at every point. There is no air leakage where the sash is cut out for the cord, nor seepage around the rib when the sash shrinks. The metal-to-metal contact insures a perfect fit and closure; also an easy-sliding sash under all conditions.

A Higgin Installation means added comfort, greater fuel saving, increased satisfaction with the heating system.

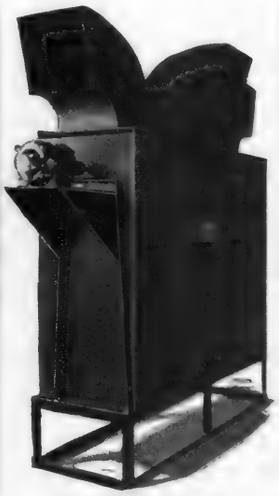
HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The HIGGIN Mfg. Co.

Newport, Ky.

Toronto, Canada.

Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens



York Unit Heaters

Do you KNOW how warm air circulates?

The circulation obtained is the principal factor to be considered in the selection of factory heating equipment.

Our Bulletin shows the results of a Smoke Bomb Test of Unit Heaters installed.

It conclusively proves that the advantage of making an ally of nature is measurable at the coal pile.

Write for Bulletin C-25,—no obligation whatever.

York Heating & Ventilating Corp.

1506 Locust Street PHILADELPHIA, PA.

JAMES M. SEYMOUR

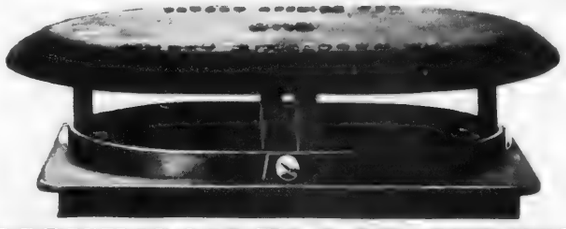
Established 1888

Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.

Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

SEND for BULLETINS, PRICES, and DISCOUNTS



DICKINSON FLOOR VENTS

ADJUSTABLE MUSHROOMS

Round 8" and 10"
Fully and easily adjustable
Rigid and Rugged Cast Iron

ÆOLUS DICKINSON CO.
3336-44 S. Artesian Avenue
CHICAGO

Oval 8" x 12"
With our labor saving square bottom
Saves money in installing

FRANK D. CHASE, INC.
Architects and Engineers

DOWNEY HEATING & SUPPLY CO.
Heating and Ventilating Contractors

Silentvanes Ventilate New Building of Milwaukee Journal!

Our engineering staff stands ready to serve you either in recommending or supplying proper ventilating equipment. Let us send you our Silentvane catalog 290.

The new building of the Milwaukee Journal, Milwaukee, Wis., marks the success of one of America's most progressive newspapers.

In architecture, construction, and mechanical equipment, this prominent building might well be classed as one of the finest and most modern structures in the country.

Eight Sturtevant Silentvanes—the finest ventilating fans on the market—are furnishing ideal ventilation, by distributing 90,000 cubic feet of air a minute throughout this building.

Among the Architectural and Engineering professions the Silentvane holds a well deserved reputation. It is universally acknowledged the best type of ventilating fan on the market today. Such features as quiet operation, high maximum efficiency and the self-limiting horsepower characteristic which saves power and prevents motor overload, have put this fan foremost in the ventilating field.

B. F. STURTEVANT COMPANY

Sales Engineering Offices

Atlanta, Ga. — Los Angeles, Cal.
Boston, Mass. — Minneapolis, Minn.
Buffalo, N. Y. — Montreal, P. Q.
Camden, N. J. — New York City
Chicago, Ill. — Pittsburgh, Pa.
Cincinnati, Ohio — Portland, Ore.
Cleveland, Ohio — Rochester, N. Y.
Dallas, Tex. — St. Louis, Mo.
Denver, Colo. — Salt Lake City, Utah
Detroit, Mich. — San Francisco, Cal.
Hartford, Conn. — Seattle, Wash.
Indianapolis, Ind. — Toronto, Ont.
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Plants located at

Hyde Park, Mass. — Berkeley, Cal. — Camden, N. J.
Sturtevant, Wis. — Framingham, Mass. — Galt, Ontario

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American Trading Co. — Tokio
American Trading Co. — Shanghai
Catton Neill Eng. & Mach. Co., — Manila
H. P. Gregory & Co., Ltd. — Sydney
Honolulu Iron Works Co., — Honolulu, T. H.
Blair, Reed & Co., Ltd. — Wellington
Wesselhoeft & Poor — Caracas
Wesselhoeft & Poor — Bogota
General Machinery Co. — Tampico
Pedro Maritino, Inc. — Lima
Compania Italio-Americana de Importacion — Buenos Aires
A. E. Barker — Johannesburg

1490

SPRACO
AIR FILTERS

MEET THE MOST RIGID SPECIFICATIONS FOR THE BETTER CLASS OF BUILDINGS SUCH AS—

CONNECTICUT MUTUAL LIFE INSURANCE COMPANY
Hartford, Connecticut

BANK OF CALIFORNIA
Seattle, Wash.

PHILADELPHIA GENERAL HOSPITAL
Philadelphia, Penn.

ALLERTON HOTEL
Cleveland, Ohio

BLOOMFIELD PRESBYTERIAN CHURCH
Bloomfield, N. J.

RITZ TOWER APARTMENT HOTEL
New York City

COLUMBUS SCHOOL
New Rochelle, N. Y.

UNIVERSITY CLUB
Boston, Mass.

DOYLESTOWN COURT HOUSE
Doylestown, Penn.

Send for Bulletin F-81

SPRAY ENGINEERING CO.
BOSTON, MASS.

RAECO
Adjustable Mushroom Air Diffusers

Type A as shown above complete with galvanized iron sleeve.

are the product of long experience in air distribution. Adjustment simply secured without varying height of tops.

For use in
AUDITORIUMS
ASSEMBLY HALLS
THEATRES, Etc.

RICHMOND AIR EQUIPMENT CO.
908 E. Cary Street, Richmond, Va.

Improved Rotary Type 22

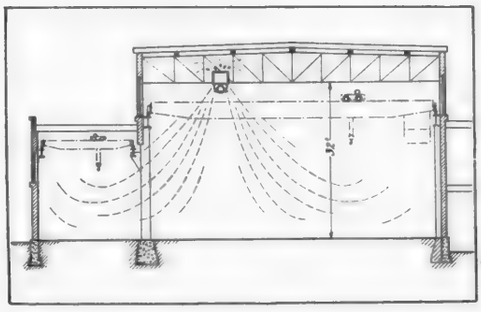
This cut shows a complete installation of Underground Oil Storage Tank-Piping and Johnson Improved Rotary Oil Burners. Note—How Simple—and Safe. Can be readily installed in most any Boiler Heater or Furnace. Patented features of Centrifugal Atomization permit the cheapest grade Fuel Oil to be pumped and burned with high economy and satisfactory service—Listed as standard by Underwriters' Laboratories.

Write for Our Latest Bulletin No. 28D, describing and listing this Oil Burner Masterpiece.

Main Office and Factory
S. T. JOHNSON CO.,
OAKLAND, CAL.

Distributors and Branches
San Francisco, New York, Chicago, St. Louis, Philadelphia, Detroit, Dallas, Los Angeles, Indianapolis, Portland, Seattle, Milwaukee, Louisville, Bridgeport, Paterson, Sacramento, Buffalo, Toronto, Montreal, Cleveland, Hull, Fresno, Kansas City, Oklahoma City, Honolulu, Minneapolis, Washington, New Orleans, Miami.

The "Wing" Idea of Correct Factory Heating



PROPOSAL

INSTALLATION

Gentlemen: Feb. 26, 1925.

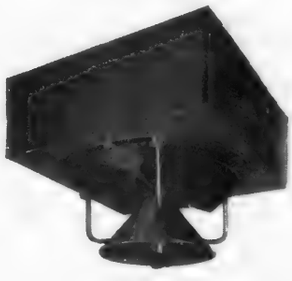
In reply to your inquiry we are pleased to state that the Wing Featherweight Unit Heaters installed in our erecting shop last Fall are giving very satisfactory service. As compared with last year, we are heating about 50% greater space with only a small increase in cost of fuel. A large part of this saving is due to the above heaters although a part is due to increased boiler efficiency. We have had no mchanical difficulty with the above units and the installation was very simple. The distribution of heat is very satisfactory even to the low area adjoining the erecting shop in which the heaters are located.

We shall be pleased to show this installation to any one interested should you care to have us do so.

Yours very truly,

ELECTRIC MACHINERY MFG. COMPANY.
By (Signed) S. W. PALMER.

SATISFACTION



This is the type of **WING FEATHERWEIGHT UNIT HEATERS** used in the Erecting Shop of the Electric Machinery Mfg. Co., illustrated above. From a point above the traveling crane they discharge the heat directly downward, thus assuring uniform and immediate heating of the working level.

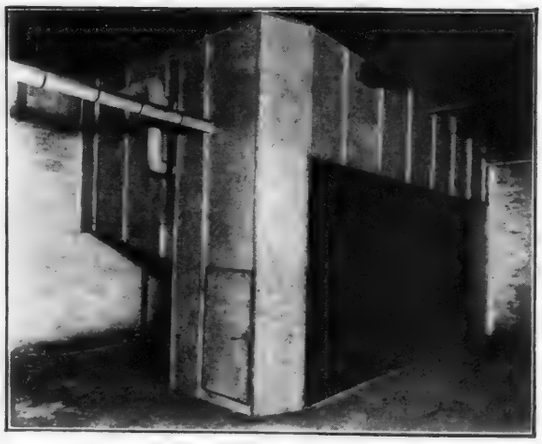
There are other decided advantages of this type of installation that we would like an opportunity of explaining to you, such as saving of floor and wall space, overhead pipe lines, no floor trenches, etc.

L. J. Wing Mfg. Co.

Fans & Blowers, Unit Heaters, Damper Regulators, Small Turbines

Hudson and 13th Sts., New York

TANG L DUST
TRADE MARK REGISTERED



In the Beltzhoover School in Pittsburgh, 50 Tangldust Air Filters keep the air clean and free from destructive dirt and bacteria-laden dust.

Pittsburgh Selects Tangldust Air Filters for Schools

In Pittsburgh Schools the elimination of destructive dirt and bacteria-laden dust is always a problem. Air filtering equipment must pass the most rigid tests before selection.

Perhaps that is why they selected Tangldust Air Filters for three Pittsburgh Schools—the Allegheny Vocational School, the Gladstone and the Beltzhoover Schools.

Tangldust Air Filters are an entirely new departure in air filter construction and operation. Send for bulletin H and see why Pittsburgh selected them for school ventilation.

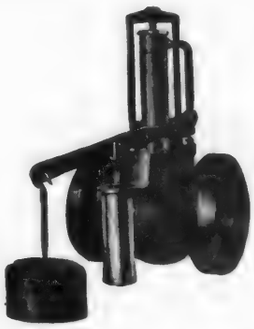
Send To-day for Bulletin H-5

Cooling Towers—Air Washers—Spray Systems

The Cooling Tower Co., Inc.
NEW YORK

15 John St. Branches in Principal Cities New York

VALVE MAKERS FOR OVER FIFTY YEARS



WINTER is here, and in spite of everything, it's hard to keep the coal bill down. But a Davis pressure regulator will help. It takes steam at boiler pressure and delivers it at reduced pressure for heating plants and auxiliaries. And it's on the job, keeping the coal bill down all the time. It's built for continuous trouble-proof service.

The Davis Pressure Regulator is dependable because it is mechanically simple. Pressure balanced by weight—not by springs which may deteriorate. An oil dash pot gives steady service without chattering. And the lever makes its action visible—you can test it by hand.

DAVIS VALVE
STEAM SAVERS SINCE 1875
SPECIALTIES

G. M. DAVIS REGULATOR CO., 436 Milwaukee Avenue, Chicago, Ill.

H&V2-B-RTG

For Dependable Service

Specify

Kelly Automatic Steam Air Valve

All Metal Non-Adjustable

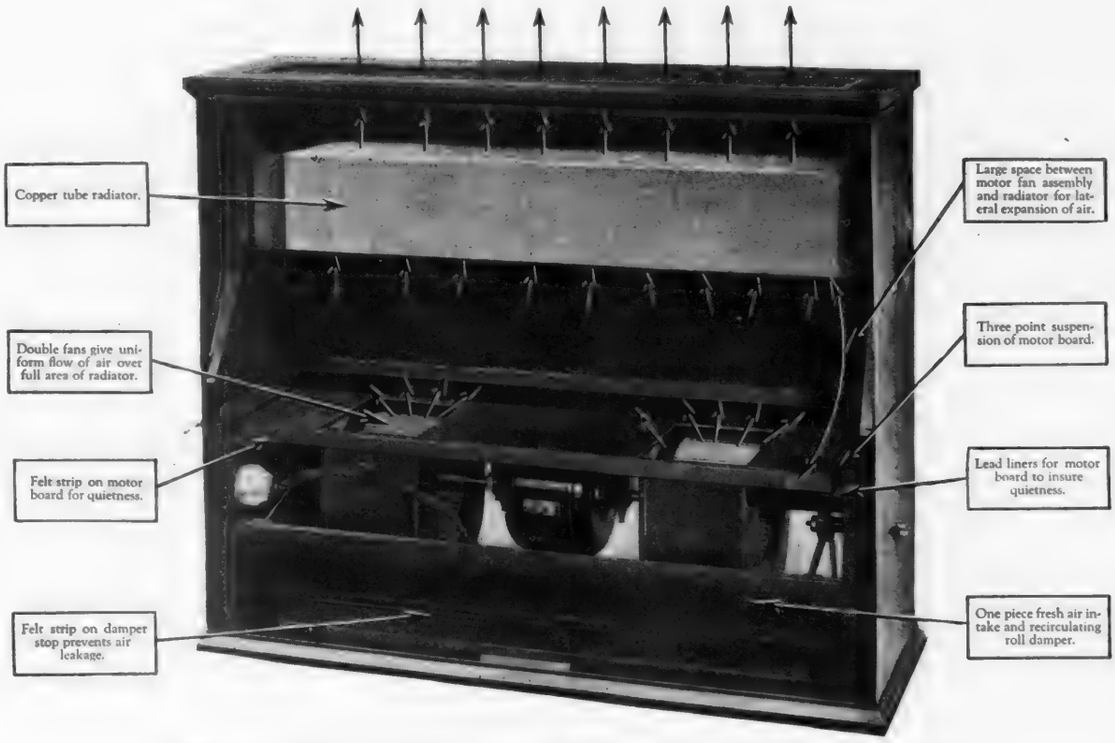
KELLY BRASS WORKS
226 West Ontario St.
Chicago, Ill.

Made in 1/8" standard pipe connection only.

Send for full details

Universal Unit Ventilation System

After years of research and experimenting
the following MECHANICAL FEATURES were adopted


Copper tube radiator.
Double fans give uniform flow of air over full area of radiator.
Felt strip on motor board for quietness.
Felt strip on damper stop prevents air leakage.
Large space between motor fan assembly and radiator for lateral expansion of air.
Three point suspension of motor board.
Lead liners for motor board to insure quietness.
One piece fresh air intake and recirculating roll damper.

UNIVERSAL UNIT WITH FRONT AND BY-PASS DIVISION PLATES REMOVED,
SHOWING RADIATOR AND MOTOR FAN ASSEMBLY IN PLACE

The Universal Unit

"The standard by which all other makes are measured"
(REGISTERED U. S. PATENT OFFICE)

JOHN J. NESBITT, INC.,

213 NO. VERMONT AVENUE,

ATLANTIC CITY, NEW JERSEY

Denver, Colo.
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St. Paul, Minn.

Branches and Representatives
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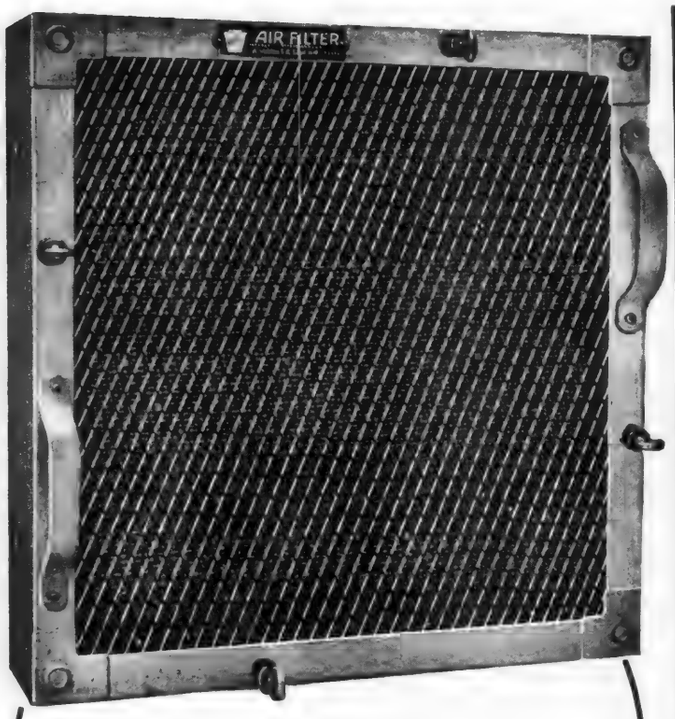


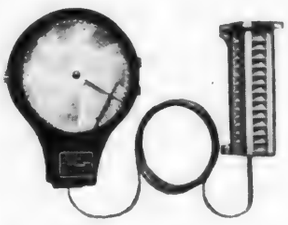
A Superior Product!

Write for Bulletin No. 643

Correspondence invited regarding representation in open districts.

DURO COPPER MEDIA
ALL METAL AIR FILTER CO.
3151 Shields Ave., Chicago, Ill.

No Excuse For Cold Apartments



A sudden drop in outside temperatures soon brings discomfort indoors unless the heating apparatus is aligned with the changes.

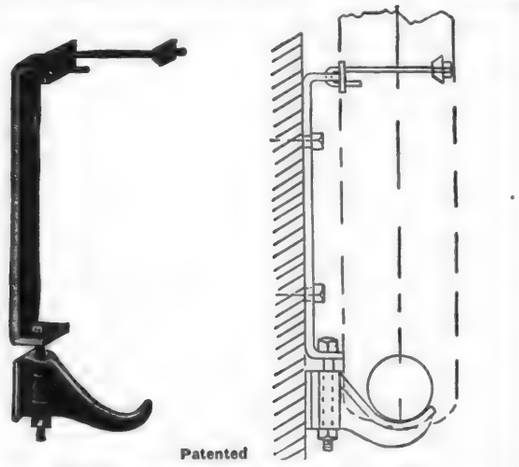
BRISTOL'S
Atmospheric Temperature
RECORDER

places a continuous record of outside temperatures before the engineer. A glance at the chart tells him of any change before he is otherwise aware of it.

Knowing in advance, he is prepared for the emergency and no inconvenience is experienced by the tenant.

Ask for Bulletin N-1103.

The Bristol Company *Waterbury, Connecticut*
FOR 36 YEARS — Ask Any Technical Engineer — MAKERS OF
BRISTOL'S RECORDING INSTRUMENTS



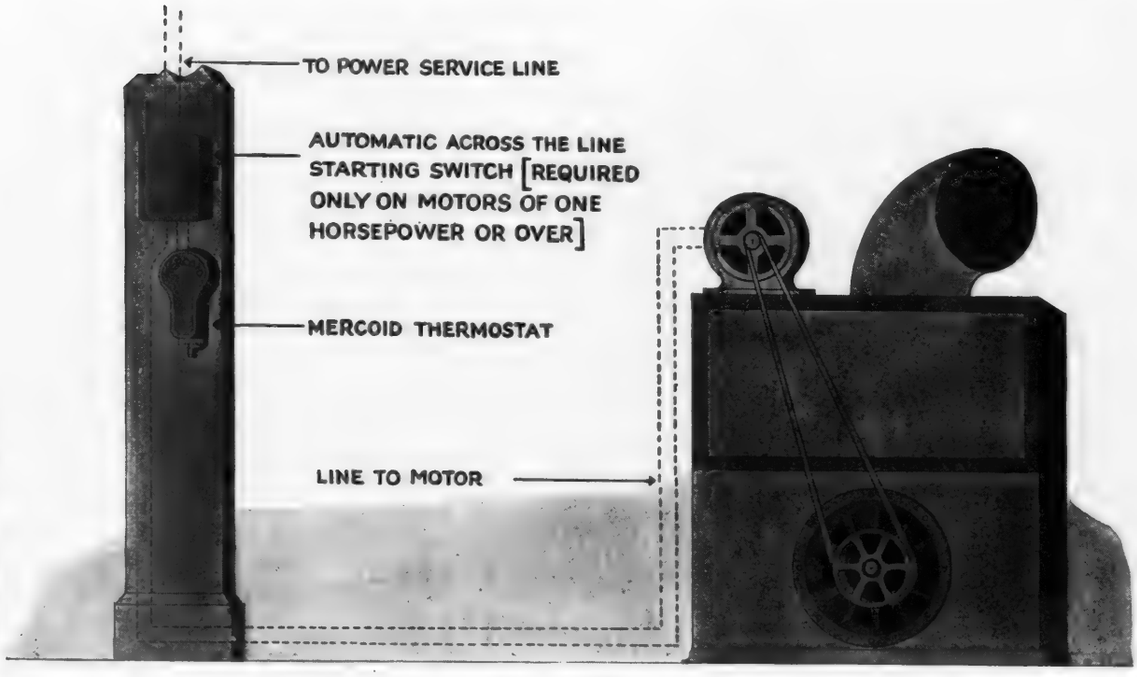
Patented
No. 9 Bracket for Legless Column Radiation

All That A Radiator Bracket Should Be

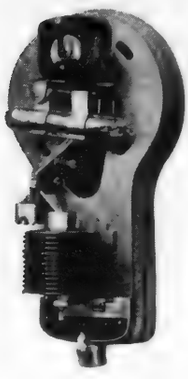
Gleockle Radiator Brackets are designed and constructed by men who are thoroughly familiar with radiator bracket requirements. They are all that a radiator bracket should be. They are safe, convenient, durable, adjustable, easy to erect, inexpensive, invisible after erection and will fit any make of wall radiator.

Send for descriptive booklet and trade discount

FIT ANY MAKE OF RADIATOR
A. F. GLEOCKLE, Jr.
415 Bay Street, Rochester, N. Y.


TO POWER SERVICE LINE
AUTOMATIC ACROSS THE LINE STARTING SWITCH [REQUIRED ONLY ON MOTORS OF ONE HORSEPOWER OR OVER]
MERCOID THERMOSTAT
LINE TO MOTOR

Typical installation of Mercoid Thermostat on one type of Unit Heater



Mercoid Thermostat with cover removed. Temperature is adjusted by moving indicator.

Announcing– an automatic Mercoid control for Unit Heaters

Maintains steady room temperature—saves steam increases the efficiency of workers

TO those familiar with the installation or operation of Unit Heaters, this announcement will come as welcome news.

Hitherto there has been no simple method of automatically controlling the operation of a Unit Heater.

Now, thanks to this new application of the well known Mercoid thermostat, room temperature may be maintained at any desired degree.

The saving of fuel, while important, is only one of the benefits of this automatic control.

Maintaining of even room temperature is now known to be a prime factor in increasing the efficiency of workers. Tests have proved that workmen do better work and more work when the correct temperature is maintained.

Write for descriptive circular.

Interesting facts about Mercoid control for Unit Heaters

WHEN heat in room rises above desired point, mercoid stops the fan automatically, starting it again when temperature falls. If, in addition, control of steam flow is desired, this can be accomplished through the use of the Arco Motor Valve in steam supply.

Mercoid Thermostats are regularly furnished with an adjustable range of 56° to 80°. Higher or lower temperatures can be supplied.

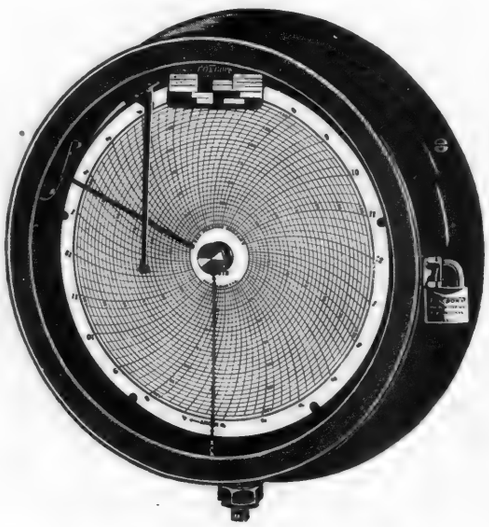
Contacts are enclosed. No open arc. No corrosion.

Mercoid Thermostats will carry line current, either D. C. or A. C. 25-60 cycle, 110 or 220 volts. Motors drawing more than 10 amperes at 110 volts should be equipped with an automatic starting switch.

AMERICAN RADIATOR COMPANY

IDEAL Boilers, AMERICAN Radiators, ARCO Valves and Regulators

1807 Elmwood Avenue Dept. S Buffalo, N. Y.



Save One Man's Time—More Accurate Results

A large Pennsylvania steam heating company had always employed one man exclusively while testing condensation meters on all consumer lines. Several Foxboro Flow Meters now do this work. Tests are much more accurate. Also, these Foxboro Meters save one man's time at 50 cents an hour.

This company realizes that no engineer or production manager can improve conditions in his plant until he knows what they are. Foxboro Instruments show exactly what conditions are every minute of the day and night.

The use of these accurate, dependable instruments will enable you to increase production and to save men, money and materials.

What is your problem? Write or wire. Your case will be given individual attention.

THE FOXBORO CO., Inc.

Neponset Avenue, Foxboro, Mass., U. S. A.

New York Chicago Boston Philadelphia Pittsburgh
Cleveland Rochester Tulsa Atlanta
Los Angeles San Francisco Portland, Ore.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

GORTON VALVES

1920-1926

McCormick & Co., Inc. Building, Baltimore, Md.
Covers entire block

Another Notable Installation
GORTON QUALITY VALVE

Send for full particulars

Gorton & Lidgerwood Co.

96 Liberty Street, New York, N. Y.

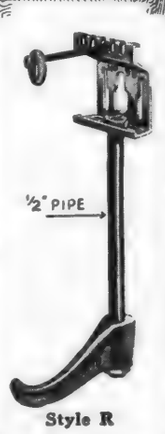
Established 1887 Representatives in Principal Cities

E Z

RADIATOR HANGER

HERE'S the hanger made with both up and down and sideway adjustments. No accurate placing of anchor bolt necessary.

For ANY wall—any type of radiator.

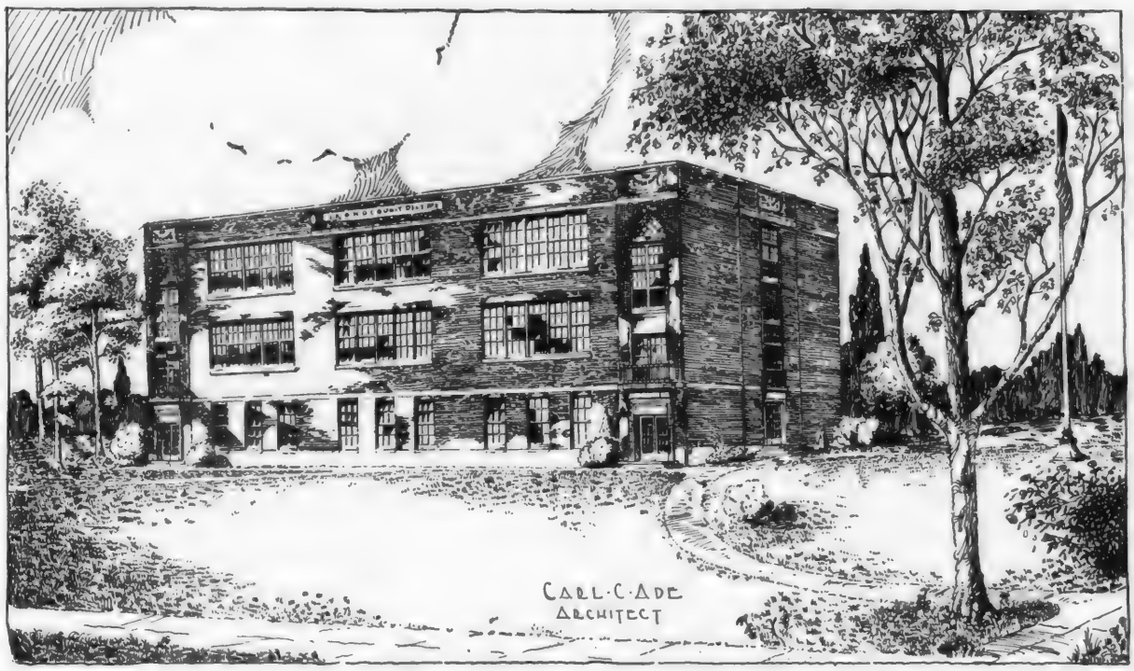


Style R

HEALY-RUFF CO.

772 Hampden Avenue,
ST. PAUL, MINN.

"A big help to Customers"



DISTRICT NO. 2 SCHOOL—IRONDEQUOIT, N. Y.

Architect, Carl C. Ade, Rochester, N. Y.
Heating Contractor, Arnsmeyer-Warnock-Zahrndt, Inc., Rochester, N. Y.

This New School Building is Now Being Equipped with Buckeye Heatovents

ARCHITECTS and builders everywhere are enthusiastic about the appearance of the Buckeye Heatovent.

It is finished with the same care and workmanship as any fine piece of furniture or expensive automobile. The Buckeye Heatovent, unit system of heating and ventilating, is made in any finish and will harmonize with the interior of your particular building.

Upon request we will send you an illustrated booklet giving full information about the Buckeye Heatovent.

Buckeye Heatovents incorporate the latest and best engineering principles and are constructed of the very highest class materials and workmanship. These features, together with that intangible asset "Buckeye Service" insure your clients against poor ventilation and future repair bills.

Full description and detailed drawings are to be had in our data book for architects and engineers, available on request. But our complete service includes, also, that of co-operation on the part of members of our engineering staff, who will consult with you on your heating problems.

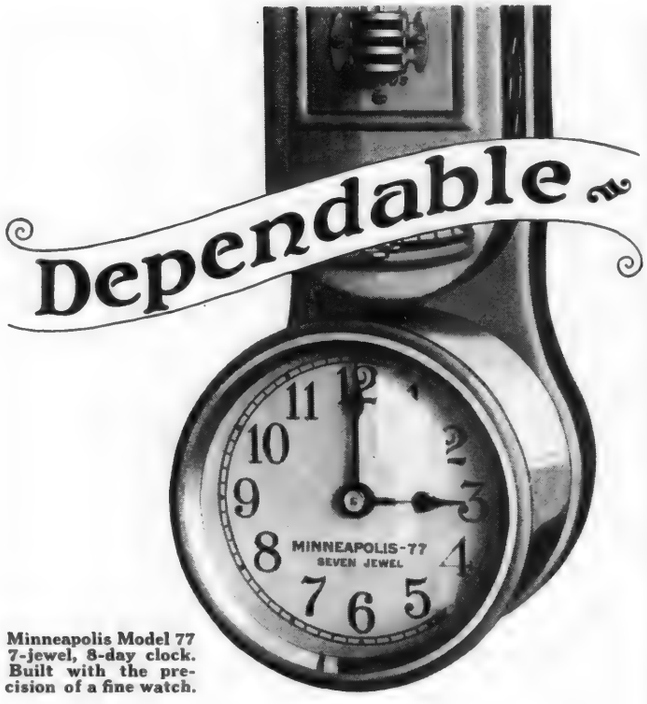
Our new catalog is now ready. Write for your copy now.
Any of our Branches can supply you.

BUCKEYE BLOWER CO.

COLUMBUS, OHIO

BRANCH OFFICES:

372 Whitehall St., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
333 Jackson Bldg., Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
401 Transportation Bldg., Chicago, Ill.
1226 California St., Denver, Colo.
3115 N. Central Ave., Indianapolis, Ind.
1011 Pioneer Trust Co. Building, Kansas City, Mo.
250 Columbia St., Detroit, Mich.
1400 Broadway, New York, N. Y.
321 Bulletin Bldg., Philadelphia, Pa.
709 Columbia Bank Building, Pittsburgh, Pa.
210 Dooly Building, Salt Lake City, Utah.
405 Sharon Building, San Francisco, Cal.
Fales Building, Seattle, Washington.
206 Comstock Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio
408 Meredith Bldg., Toledo, Ohio.



Minneapolis Model 77 7-jewel, 8-day clock. Built with the precision of a fine watch.

Ask any Jeweler about these features

Ask any jeweler or clock maker to examine these features of this remarkable clock: Its compensated balance, unusually heavy plates, genuine Brequet hair spring, 7-jewel construction. He will tell you that the workmanship and materials in these features and throughout the Minneapolis 77 are marks of real quality and that these are the factors that govern the dependability and durability of any time piece.

The materials in the Model 77 Clock, together with precise workmanship, establish a new standard of clock construction for heat regulation service. The Minneapolis organization completely controls the quality of the Model 77 Clock because it is built in its entirety in the Minneapolis factory.

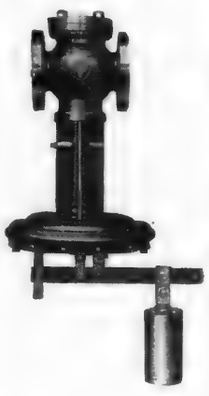
The simplified Model 77 Thermostat, equipped with this better clock, has demonstrated its reliability in thousands of homes. It is the nearest approach to perfection in the history of automatic heat regulation.

Let us send you complete information. Write today.

Minneapolis Heat Regulator Co.
2804 Fourth Ave. So. Minneapolis, Minn.
Established 1885

The "MINNEAPOLIS" HEAT REGULATOR for COAL—GAS—OIL

A New Mason Product



The new Mason Lever Style Reducing Valve is rapidly attaining the same popularity among heating engineers for regulating steam at low pressures as the well known Mason high pressure reducing valves so widely used industrially.

Like all Mason products it is built for a lasting accuracy of performance that means true economy.

Write for Pocket Catalog and Handbook No. 62.

Mason Regulators
MASON REGULATOR CO.
Boston, Mass
8851

Approved—

the CROWN Fuel Saver and Smoke Abater

for homes, apartment houses, factories, stores—for any style heating plant. Selected by engineers and contractors who seek economical heating efficiency because—

It creates more heat from less fuel
Burns volatile gases and smoke
Makes practical the use of low grade fuels
Fuel is almost entirely consumed —less ash
Conforms to the recommendations of government engineers
20% Fuel Saving Guaranteed

The sound, scientific principle of the CROWN is at once recognized and its supremacy acknowledged. Distributors find a ready market for this remarkable device in both old and new buildings. Send for interesting descriptive booklet and learn of the liberal profits accorded our dealers.

CROWN FUEL SAVER CO.
70 N. 10th St., Richmond, Ind.
Sole Canadian Distributor:
33 St. Vincent St., Montreal, Can.

Modern Schoolroom Heating and Ventilating

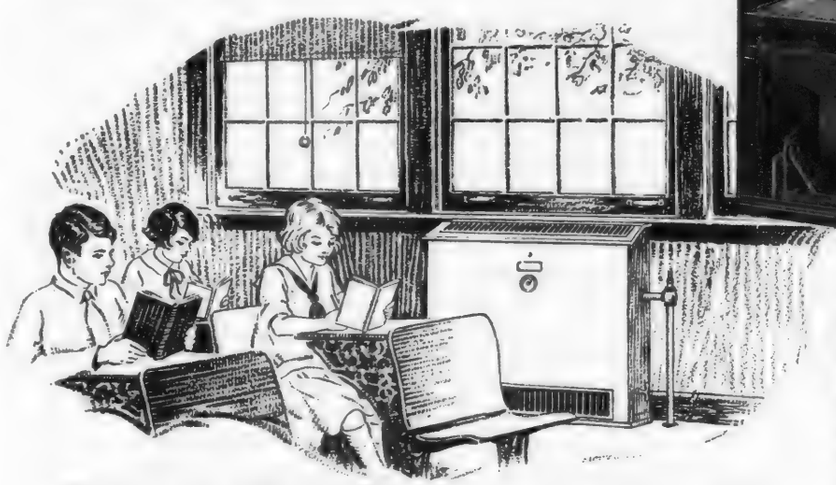
THE PeerVent Unit System of Heating and Ventilating is especially advantageous in school buildings.

Each room gets an independent and dependable supply of fresh air.

Each room is heated separately, according to its needs, regardless of conditions in other rooms.

Each room is ventilated and heated without waste.

To these quite obvious features the PeerVent System adds many technical advantages—fully described in our catalogue—yours on request.



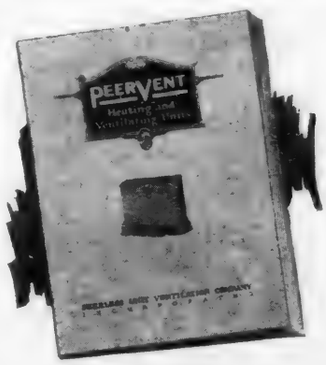
PeerVent Unit with the front plate removed, showing (1) the fans which draw in fresh air from out-of-doors, (2) the air filter, and (3) the remarkable Peerfin Radiator which heats the air to any required temperature. Control of room temperature is obtained by a simple mixing damper (not illustrated) which by-passes some or all of the incoming air around the radiator, or directs it all through the radiator, as needed.

PEERLESS UNIT VENTILATION CO., INC.
Skillman Avenue and Hulst Street
Long Island City, N. Y.

808 Monadnock Bldg. CHICAGO
100 Boylston St. BOSTON
196 Worthington St. SPRINGFIELD, MASS.
339 Second Avenue PITTSBURGH
1836 Euclid Avenue CLEVELAND
723 Lafayette Bldg. DETROIT
520 Securities Bldg. DES MOINES
927 Board of Trade Bldg. PORTLAND, ORE.
77 York St. TORONTO, CANADA

PEERVENT

Heating and Ventilating Units

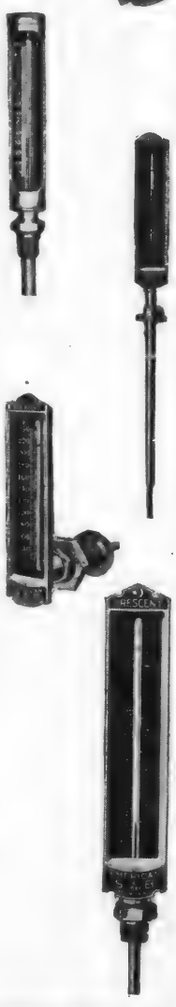


Write for Catalogue
(on your letterhead, please)

Quick Delivery

Now you no longer need to be handicapped by slow deliveries on thermometers. Increased manufacturing facilities have enabled us to lay in a stock of all standard types and ranges of Crescent Thermometers for every industrial purpose. They're all boxed and ready for shipment the day orders are received.

Crescent Thermometers have heavily lacquered, polished brass "V" shaped case with removable glass front which permits of easy cleaning. The scale is also "V" shaped and graduated on both sides.



Large white enameled figures and graduating lines on the black dial, with a highly magnifying mercury tube, give maximum reading convenience. Made with 7", 9" and 12" scale; rigid union or separable-socket connections; straight or angle stem of any length. Bulb chambers of Monel metal.

For accuracy, workmanship and appearance Crescent Thermometers have an enviable reputation.

We have facilities for quickly repairing **all** makes of thermometers.

Our new 52-page catalog pictures every conceivable style and size of thermometer as well as all kinds of thermometer accessories. Send for it. Ask for Catalog F-14.

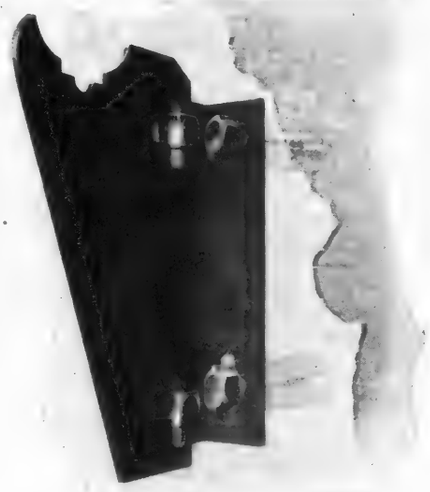
AMERICAN SCHAEFFER & BUDENBERG CORP.
BROOKLYN, N. Y.

*Boston	Detroit	Tulsa
Buffalo	*Los Angeles	Philadelphia
*Chicago	Salt Lake City	*Pittsburgh
Cleveland	*Seattle	

*Stock carried at these branches.

Crescent Thermometers

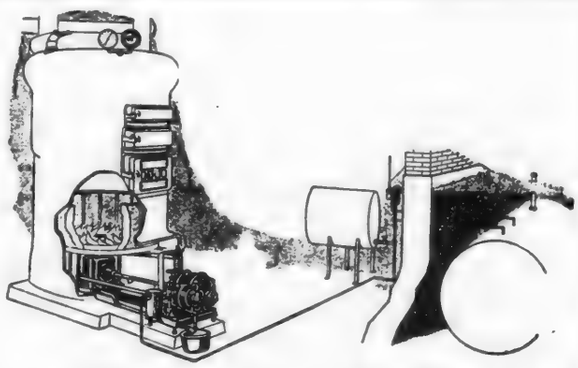
NEW PATENTED HARTMANN ADJUSTABLE RADIATOR BRACKETS



Notch Fits Any Type Radiation
Slots for Horizontal and Vertical Adjustment
Slot Allows for Difference in Brick Spacing

Write for Dimensions and Price List

CHARLES HARTMANN CO.
985 Dean St. BROOKLYN, N. Y.



A LOW PRICED DEPENDABLE OIL BURNER

THE IDEAL ROTARY is a mechanical draft burner, either full automatic or manual control.

It can be sold in price competition with atmospheric types.

The flame is a circular horizontal sheet, applied at the grate line.

Domestic fuels of all grades commonly supplied may be used. The lower limit is 22° A.P.I.

Manually controlled burners are priced as low as $75.00, net to dealer.

The IDEAL ROTARY makes a strong appeal to the heating contractor because of low price, low cost of installation and simplicity almost eliminating service calls.

A request from you will result in a demonstration of the IDEAL ROTARY, at a time and place to suit your convenience.

IDEAL ROTARY BURNER CO.
2 W. Clark Ave., York, Pa.

PECCO INC.
PECCO
ST. LOUIS

High Grade Sales Representatives!

Pecco Unit Heater Line offers desirable Sales Agency

For the men who have the right qualifications, the exclusive territorial sales rights on Pecco Heaters is a real business opportunity.

Buyers have accepted the unit heater principle as the best yet discovered, and all Pecco needs is good, live men to work on live prospects and active jobs, and close the orders.

Here is all we think a man needs to make a big success with the Pecco Line:

1. A sound knowledge of heating and ventilating practice, or a mechanical experience that will make him capable of learning it from us.
2. The ability to present an honest proposition in an honest, sincere, straightforward way.
3. The ambition to build up for himself a healthy business, with the assurance that he will have ample help from the home office.

To any man who can meet these simple qualifications, and who can show us an earnest purpose to make good for himself and for us, we will go the limit to educate him in this business, and aid him in every way to make his time pay him real money. Write for preliminary details of the Pecco Sales Agency.

PECCO INCORPORATED

2975 North Market Street ST. LOUIS, MO.

Scott Bronze Gate Valves

No. 0	—S.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 1	—S.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 2	—F.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 8	—S.E. Hose Gate—Non-rising Stem	125 lbs. S.W.P.
No. 22	—S.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 23	—F.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 170	—S.E. Solid Wedge—Non-rising Stem	150 lbs. S.W.P.
No. 171	—F.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 172	—S.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 173	—F.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 41	—S.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 42	—F.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 1-A	—S.E. Solid Wedge—O.S.&Y.	150 lbs. S.W.P.
No. 172-A	—S.E. Solid Wedge—O.S.&Y.	175 lbs. S.W.P.
No. 41-A	—S.E. Solid Wedge—O.S.&Y.	250 lbs. S.W.P.

Scott Iron Body Gate Valves

No. 35	F.E. Inside Screw—Single Disc	40 lbs. S.W.P.
No. 35-A	—F.E. O.S.&Y.—Single Disc	40 lbs. S.W.P.
No. 300	—F.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 301	—S.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 431	—S.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 432	—F.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 433	—S.E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 434	—F.E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 637	—S.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 638	—F.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 639	—S.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 640	—F.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 843	—S.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 844	—F.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 845	—S.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 846	—F.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 847	—S.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.
No. 848	—F.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.

There's a Scott Valve
For Every Job You Have

The Scott Line is Practically Complete

For your convenience in ordering by figure number, we list herewith and in succeeding advertisements Scott Valves for every service.

Scott Gate Valves are full weight, rugged in construction, and are made of the highest grade bronze or iron. They have an enviable record over a period of 40 years for dependable and efficient service.

SCOTT VALVE MANUFACTURING COMPANY, 3962 McKINLEY AVENUE DETROIT MICHIGAN

Manufacturers of the Complete Line of

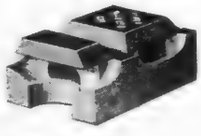
SCOTT SINCE 1886 VALVES

SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"

Did You Install Pyramid Grates and Cut Your Fuel Bills in Half Last Year?

Write us and we will give you addresses of customers who did this by installing.



Pyramid Iron Products Corp.

136 Liberty Street New York City

CORRECTLY DESIGNED

Cast Iron Blow Off Basins

also

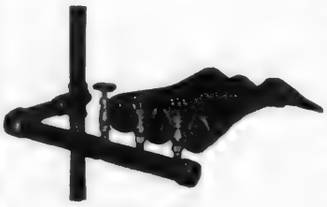
APPROVED GARAGE BASIN EQUIPMENT

INLAND IRON WORKS

99-111 McDonough Street JOLIET, ILL.

Shorten the Long Period of Stoking

WITH **Franklin** New Improved Quick Removable GAS BURNER



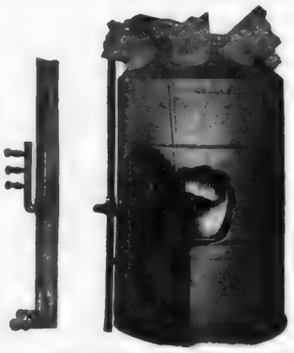
No. 3 System

Here is available a system that affords a combination of gas and coal heating. In mild weather the Franklin New Improved Quick Removable Gas Burner does away with the necessity of a coal fire. Can be used until the cold weather sets in, and again when weather moderates in the Spring. This shortens the long coal stoking period by many weeks.

Easily installed, conveniently operated, quickly removable and in reach of everyone. Operates efficiently and economically in any type boiler or furnace and under all conditions. Send for details.

THE FRANKLIN GAS BURNER MFG. CO.

Vine and Mitchell Aves. CINCINNATI, OHIO

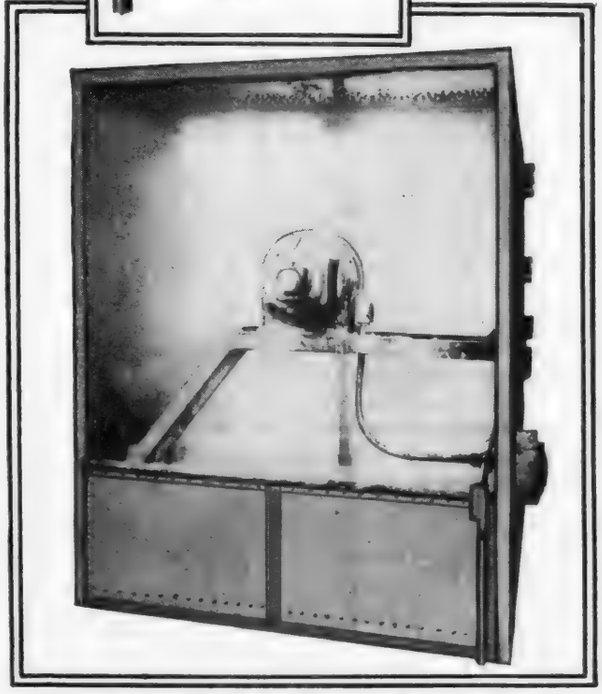


For Warm Air Furnace

Made also for Water or Steam

The Bayley Turbo Air Washer

The Bayley Turbo Atomizer, the heart of the Bayley Turbo Air Washer.



Top cut shows the Bayley Turbo Air Washer at rest, note simplicity and accessibility of construction. Lower cut shows the washer in action—the water is churned centrifugally by the Turbo Atomizer into a dense, even spray with no possibility of clogged nozzles.

Saves 40 to 60% Power Requirement

The Bayley Turbo Air Washer operates at a water pressure of only 1¾ lbs. per square inch at the nozzle. Contrast this with the 10 to 30 lbs. per square inch water pressure needed on fine orifice nozzle spray banks; it means that the Bayley saves 40 to 60% of the power required to operate high pressure systems.

The remarkable operating economy of the Bayley Turbo Air Washer is possible because of the Turbo Atomizer—exclusive with Bayley. The Turbo Atomizer produces a uniform, dense spray through a combination of low pressure and centrifugal force. Water is delivered by a single fire type nozzle to the center of a rapidly revolving rotor or spray wheel where it is churned centrifugally into a solid mist screen. The Turbo Atomizer entirely replaces the bank of fine orifice nozzles necessary in most washers. It requires only from 75 to 90% of the pressure required by the fine orifice nozzles and therefore saves from 40 to 60% of the power requirement.

Aside from its operating economy, the Bayley Turbo Air Washer has also the outstanding advantage of being non-clogging. The single, fire type nozzle (minimum diameter ¾") allows the passage of entrained solids without clogging. A single clogged nozzle in a multiple spray bank means a "hole" in the water screen, and several clogged nozzles so seriously interfere with the efficiency of the washer as to necessitate cleaning and reassembly, costly in time and money.

Non-clogging and economical in operation—these are features that make the Bayley the most efficient air washer available today. Write for Bulletin No. 25 giving the complete facts.

Bayley Manufacturing Company

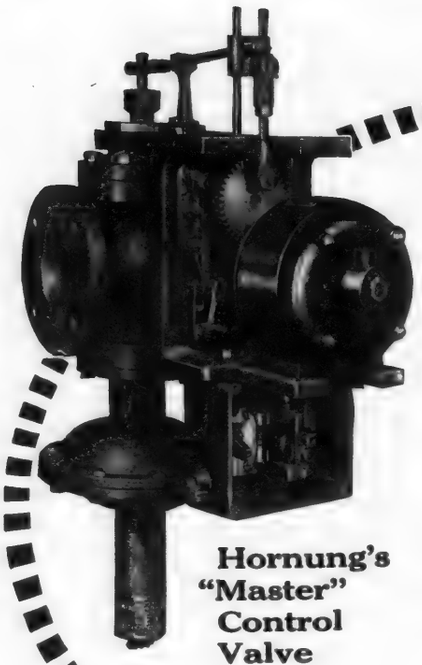
742 Greenbush St., Milwaukee, Wis.

Branch Offices:

New York—Suite 503, 30 Church St.
Buffalo, N. Y., 333 Jackson Bldg.
Pittsburgh, Pa., Leiendecker Bros., Fulton Bldg., 2nd Floor
Cleveland, Ohio, 523 Penton Bldg.
Detroit, Mich., Purcell Stone Co., 2847 Grand River Ave.
Chicago, Ill., 1156—1st Nat'l Bank
St. Louis, Mo., 1928 Railway Exch. Bldg.
Kansas City, Mo., 800 Mutual Bldg.
Des Moines, Iowa, 521 Hubbell Bldg.
Salt Lake City, Utah, P. W. Belcher, Dooly Blk.

Detroit Police Headquarters
Albert Kahn, Architect, Detroit
Drake Avery Co., Contractors, Detroit
A representative Bayley installation

Bayley
AIR ENGINEERING & EQUIPMENT
HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS—PRESSURE BLOWERS
MECHANICAL INDUCT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS



Hornung's "Master" Control Valve

CENTRAL STATION & INDUSTRIAL HEATING & LIGHTING — JCH

Remote Control of Steam—Air—Water

This motor driven valve control is applicable to many industrial uses, especially where it is desired to control steam, air, or water valves from a remote point—either manual or automatic.

The valve is furnished either single or double seated and for almost any pressure.

The unique gear arrangement protects motor against overloads of any kind.

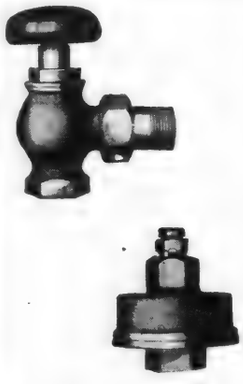
Ask us for particulars

(8367)

HEAT LOSS IS MONEY LOSS

CENTRAL HEAT APPLIANCES

343 S. Dearborn St. J.C. HORNUNG ENGINEER Chicago, Illinois.

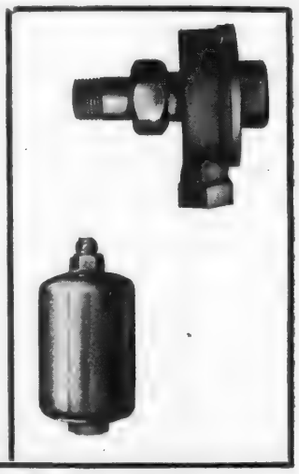


A Dependable Line of Heating Specialties

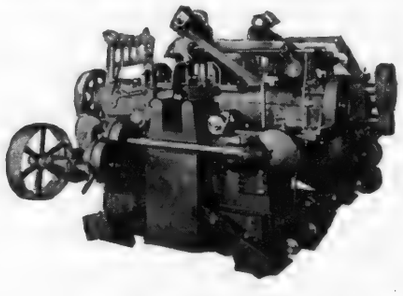
Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO



BRYANT RADIATOR MACHINERY

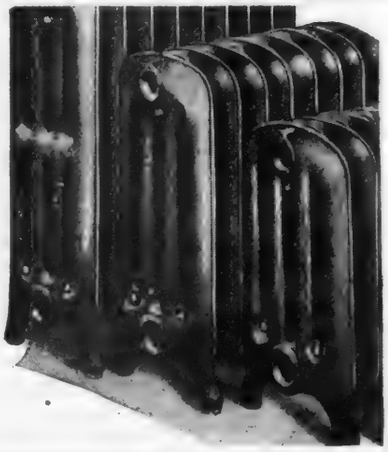


Four Spindle Horizontal Radiator Boring Machine Bores 240 Loops per hour.

This machine may also be had with automatic conveyor by which the above production may be *doubled*.

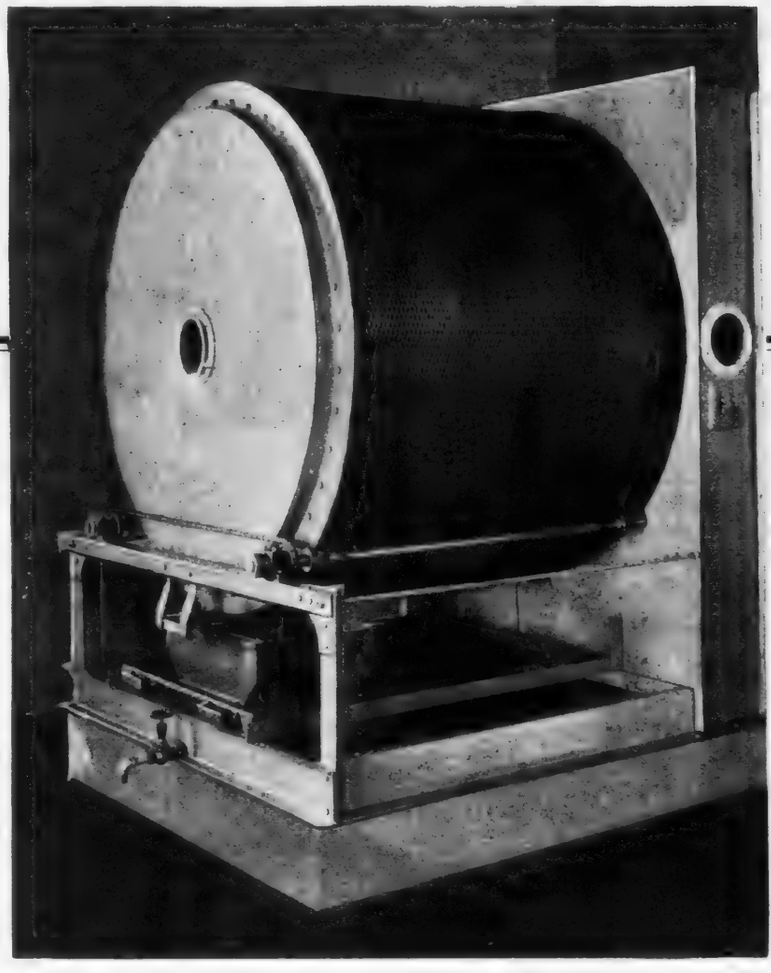
This Bryant Radiator Boring Machine completes all the boring on a radiator loop in every cycle of the machine. One operator tends the machine—he has but to place the work and touch a lever to clamp. Unclamping is automatic and loop must simply be removed. Machine is fully adjustable for holes from 8" to 45" center to center and 4" to 14" in width.

We are makers also of a full line of radiator and nipple assembling, tapping, boring, facing, drilling and testing machines, automatic and semi-automatic. Consult with us.



Third generation of Bryant's making Radiator Machinery

O. Bryant Sons & Company, 366 Ontario St., Buffalo, N. Y.



The Highest Compliment Any Device Could Receive

A prominent school board engineer (name on request) traveled 500 miles the other day especially to see a demonstration of the National Rotary Air Filter.

He had long been dissatisfied with the air filters he was using and consequently when he saw an advertisement in this magazine, he was immediately interested in the *"Filter that cleans the air and then cleans itself."*

One of his first remarks when he saw the National Rotary in action was, "You beat me to it. It's just what I would have designed if the problem had been put up to me."

While we are daily receiving the approval of engineers, architects and users, this spontaneous expression from a hard-headed engineer with a lifetime of practical experience constitutes about the highest compliment any device could receive.

But being a conscientious public servant, this engineer did not rely solely on his first impressions. He spent hours in subjecting the National Rotary to tests of all kinds—some almost unreasonable in their severity. But it met every requirement—in superior cleaning efficiency, uniformity of resistance, simplicity of construction and ease of operation.

In leaving, he not only assured us of the business but characterized the National Rotary as a big step in the solution of his problem of improving air conditions and at the same time simplifying the work of his school engineers.

The experience of this man is typical of many who have investigated this self-cleaning filter. If you have an air filter problem we will be glad to let the facts speak for themselves.

NATIONAL AIR FILTER COMPANY

9 South Clinton Street, CHICAGO

New Utrecht High School, New York City
Board of Education
Wm. H. Gompers, Architect
Thomas E. O'Brien, Inc.
Plumbing & Heating Contractors.

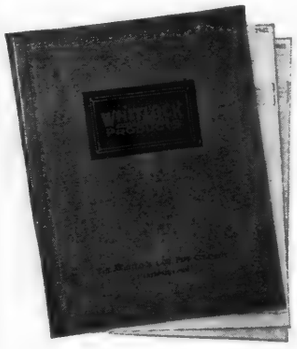
"Let Whitlock Do It"

This new high school is another building in which Whitlock did do it! The hot water problem is solved.

You have similar problems—every building requires hot water for something, wash-rooms, showers, laundry, laboratory, a swimming pool or what-not. Yes, but how much and when?

The growing number of those who rely on Whitlock at such times is a satisfaction indeed, a proof to us that we are "doing our job."

A talk with one of our Engineers will show you why so many other Engineers "let Whitlock do it." A card will bring him and you'll like the way he tackles your problem.

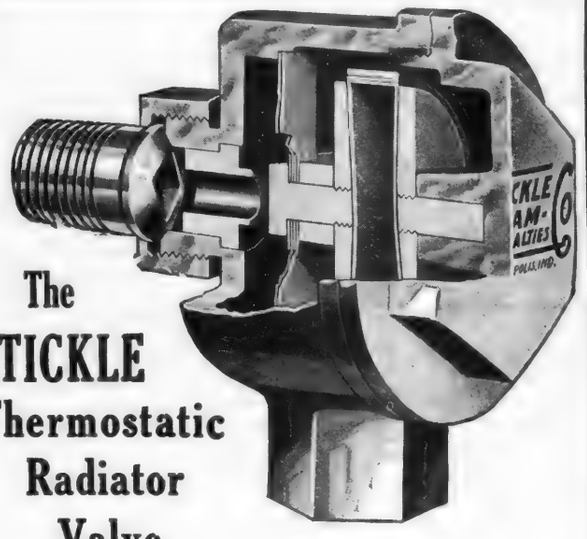


Send for these new
DATA SHEETS
prepared especially for the use of the Engineer and Architect.

THE WHITLOCK COIL PIPE CO.
40 South Street, Hartford, Conn.

New York Chicago Boston Buffalo Philadelphia
San Francisco

WHITLOCK
HEAT TRANSFER
PRODUCTS



The STICKLE Thermostatic Radiator Valve

The Expansion principle in return line Radiator Traps is not novel or new. Consequently the difference in this class of Traps is in the construction.

The expansive movement of this diaphragm is fully one-quarter inch, which is much more than is necessary for opening and closing the valve. This gives a factor of safety which is greater than any valve made, consequently it requires no adjustment. May we send you our bulletin?

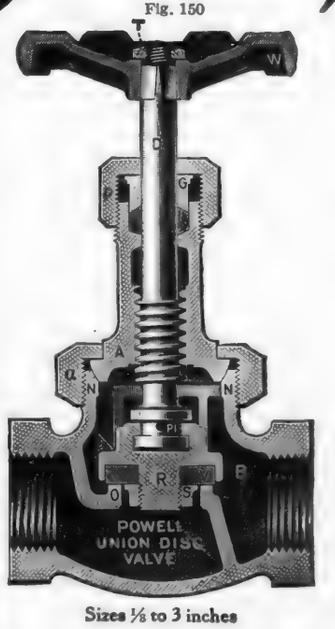
STICKLE STEAM SPECIALTIES CO.
INDIANAPOLIS, IND.

New York Office
46 E. 41st St.

Boston Office
52 Sudbury St.

POWELL VALVES

Fig. 150



Sizes ⅛ to 3 inches

UNION
COMPOSITE
DISC VALVES

ALWAYS
DEPENDABLE

For Hot Water or Steam Heating

Notice the Union Bonnet Connection

Ask your dealer for Powell Valves

The Wm. Powell Company
Cincinnati, Ohio

Positively Revolutionizes Unit Heater Performance

New—Weight only 125 lbs. complete with motor and fan — only 5% the weight of direct radiation.

New—Suspends from steam line, at any discharge level desired, by means of a length of pipe and a union. Two men and a pipe wrench make the connection.

New—No brackets, braces or structural work necessary.

New—Compact: 24¾" x 20½" x 14½" (less than 4½ cubic feet) occupying only 1/20 the space of direct radiation.

New—165,000 BTU per hour at 60° room temperature and 5lbs. steam pressure; 39 times the efficiency of direct radiation.

New — Heated air stream can be directed at any angle — toward machine, bench, window, door — by simply turning the heater on the union connection. Adjustable deflectors can be added for control of downward direction.

New—No cold spots; approximately 2000 cubic feet of air passed through the heater per minute and distributed over a wide area; ventilation as well as heating.

New — Patented condenser made by special process from selected copper and special materials, providing free contraction and expansion. Cannot leak, rust or corrode; tested to 150 lbs. hydrostatic pressure.

New—Accessibility. Four bolts release condenser; three bolts release motor and fan assembly.

On scaffold, ready to connect.

Two men do the job.

All connections made in thirty minutes.

Announcing New Standards in Industrial Heating

THE general advantages of unit heating have long been recognized. But this announcement will tell you that until now its full possibilities have gone undeveloped. 15 years' experience in the creation of heat transfer devices —plus engineering methods dominated by today's problems and unhampered by yesterday's traditions — has produced the MODINE Unit Heater. If our personal interviews with many architects, heating and building contractors and plant engineers is any criterion, the brief specifications shown here will interest you in writing for "Bulletin A" which describes MODINE Unit Heating in detail.

MODINE MANUFACTURING CO., *Heating Division*
RACINE, WISCONSIN

MODINE
UNIT-HEATER
for Steam or Hot Water Heating Systems

"Keeping Others In Hot Water"—

for
Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.

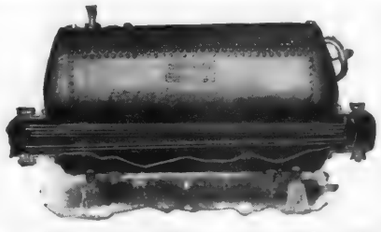
THE
D & D
Safety Boiler Control

A positive, simple, reliable and inexpensive control to be used with Oil Burners to prevent the boiler from becoming overheated. It stops the oil burner as soon as the boiler becomes excessively hot.

No more burned out Boilers or cracked Sections due to insufficient water.

Manufactured by

DAVIS & DAGGETT CO.
238 Dwight St., Springfield, Mass.



Alberger-Buffalo Storage Heaters have tubes the full length of tank which insures maximum heat transfer. Satisfaction guaranteed. Write for information on Alberger Multi Head Heaters and Howard Guided Expansion Joints.

ALBERGER HEATER COMPANY
HOWARD IRON WORKS
281-289 Chicago St. Buffalo, N. Y.

ROSS
Crosshead-GUIDED Expansion Joint Excels in

Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

REED PERFORMANCE HAS SET THE STANDARD

Highest Cleaning Efficiency

Lowest Operating Resistance

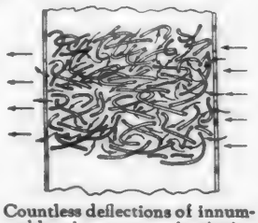
Largest Dust Capacity

3 reasons for REED preference

THOSE who know the requirements of permanently successful air filtration always demand these three essential qualities. Five years of research and tests have conclusively proved that no other medium so successfully meets *all three requirements* as split wire (steel wool) used in Reed Air Filters exclusively. This medium insures positive contact of all air streams with the adhesive-coated filaments, thus accounting for the unusually high cleaning efficiency of Reed Filters.

Economy of operation depends, of course, on the degree of *operating resistance* and *not* on *initial resistance*. A filter can be built with an unusually low initial resistance but have such a rapidly increasing operating resistance as to make it impracticable for commercial use. Because of the scientific graduation of media, Reed Air Filters maintain the *lowest operating resistance over the longest possible time* and insure maximum dust capacity besides.

The Reed Blue Book tells the whole story. Send for it without obligating yourself—using the coupon for convenience. Whether you want clean air for general ventilation or highly technical purposes, this book will be of real value.



Countless deflections of innumerable air streams impinging upon the adhesive-coated media insure maximum dust removal.

A scientific graduation in density of media, in ratio to dust elimination requirements, insures lowest operating resistance and maximum dust capacity.

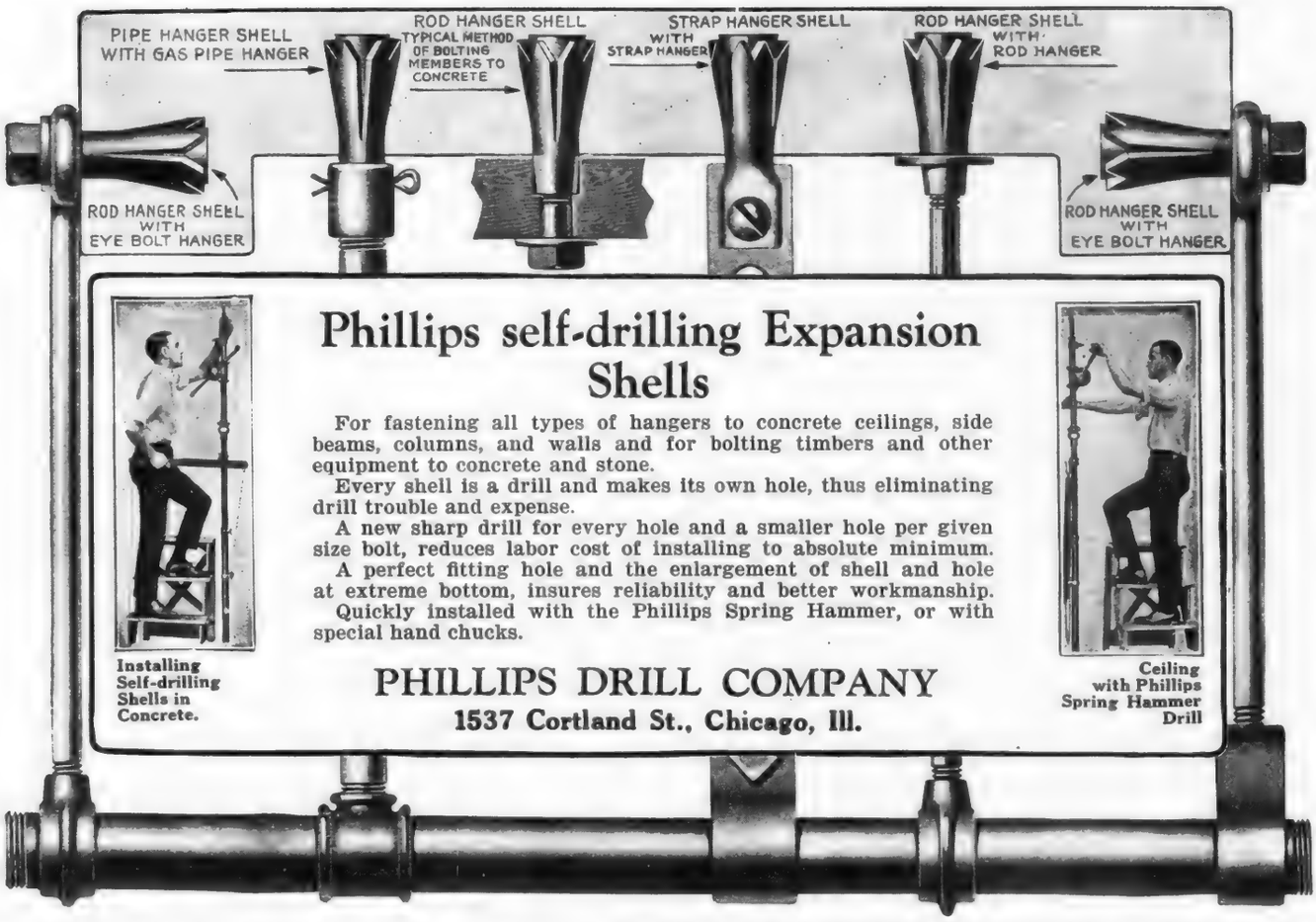
REED AIR FILTER COMPANY, *Incorporated*
215 Central Ave., Louisville, Ky. *Offices in Principal Cities*

Reed Air

TRADE MARK

filters ALL METAL

REED AIR FILTER CO., Incorporated
215 Central Ave., Louisville, Kentucky
Send, without obligating me, a copy of the Reed Blue Book.
Name ..... Company .....
Street ..... City ..... State .....


PIPE HANGER SHELL WITH GAS PIPE HANGER
ROD HANGER SHELL TYPICAL METHOD OF BOLTING MEMBERS TO CONCRETE
STRAP HANGER SHELL WITH STRAP HANGER
ROD HANGER SHELL WITH ROD HANGER
ROD HANGER SHELL WITH EYE BOLT HANGER
ROD HANGER SHELL WITH EYE BOLT HANGER

Installing Self-drilling Shells in Concrete.

Phillips self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side beams, columns, and walls and for bolting timbers and other equipment to concrete and stone.

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt, reduces labor cost of installing to absolute minimum.

A perfect fitting hole and the enlargement of shell and hole at extreme bottom, insures reliability and better workmanship.

Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

PHILLIPS DRILL COMPANY
1537 Cortland St., Chicago, Ill.

Ceiling with Phillips Spring Hammer Drill

This is IT, the VICTOR Temperature Regulator

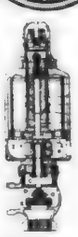
Write for our new Bulletin No. 6, which tells all about it.

See classified directory for other Atlas Regulating Devices.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.

GOLD CAR HEATING & LIGHTING NEW YORK U.S.A.

AUTOMATIC
HEAT REGULATION
ELECTRICALLY OPERATED



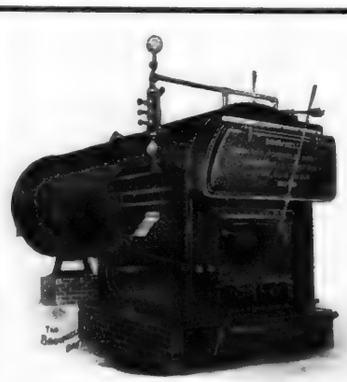
Packless Electric Valve

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

Write for General Catalog with Testimonials

Thermostat

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.



Brownell Return Flue Portable Heating Boiler—Smokeless Type

BROWNELL

Better Boilers for Heating and Power Purposes
70TH YEAR

of successful manufacturing experience. This is the reason why Brownell Boilers are specified by all the leading Heating and Contracting Engineers.

BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
HIGH IN EFFICIENCY
BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

THE BROWNELL CO.
DAYTON, OHIO

THE BROWNELL COMPANY The World Over SINCE 1855 DAYTON, OHIO, U.S.A.

Established 1855

Send for Bulletins B6 B6A

BOILERS

Filtered Air and Its Applications

Scottish Rite Temple
Peoria, Illinois
Completely equipped with Midwest Air Filters.

2. Churches and Temples

Clean air is becoming more and more an essential in the ventilation of such buildings as churches and temples.

The most important reason for the installation of Midwest Air Filters in these buildings is the necessity of removing all harmful dust and bacteria from the air. The menace of air-borne dust and bacteria, particularly in such buildings where numbers of people regularly congregate, is now fully recognized.

Of course the elimination of atmospheric dust also brings about definite savings in operating and maintenance costs of these buildings through reduced cleaning costs, prevention of damage, and deterioration to fixtures, decorations and hangings, and the elimination of much of the expense otherwise necessary for redecorating.

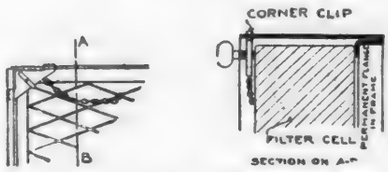
Midwest Air Filters can be as easily adapted to any conditions of space and capacity in an existing building as they can in a proposed structure.

If you are now working on any churches or temples, we will be glad to help you lay out the air filter installation.

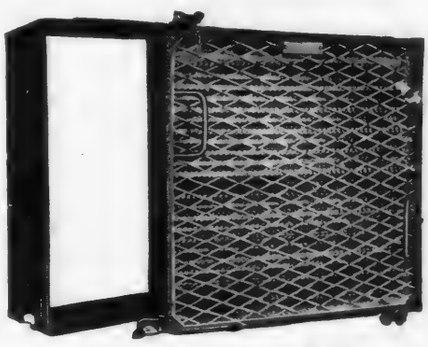
An installation is built up of standard interchangeable units (frame and filter call, 20 x 20 x 6½" overall) each with a capacity per unit of 800 CFM.

Each cell holds a large amount of dust, and does not clog up. A constant operating resistance of ⅜" water gauge is maintained by regular cleaning. Cleaning efficiency is unsurpassed by any air cleaning device on the market today.

Fig. 1 shows how the frames of a Midwest installation interlock to form an air tight joint.



Figs. 2 and 3 show how Midwest filter cells are forced against a permanent flange in the frames to form a leak-proof joint.



Cell and frame Type U-2 Midwest Air Filter

MIDWEST AIR FILTERS
INCORPORATED

Midwest Canada, Ltd.
83 Craig St. West
Montreal, Canada

Bradford, Pa.

Midwest Pacific, Inc.
Monadnock Building
San Francisco, California

Offices in Principal Cities

Why You Recommend Honeywell Controls

The oil burner is in high favor because of its quick fire, its cleanliness and other advantages. More than 40 of the most widely accepted makes are equipped with Honeywell Automatic Controls.

These include a majority of the more important Burners listed as standard by Underwriters' Laboratories, Incorporated.

This marked preference for Honeywell is necessarily the direct result of superiorities--of higher quality, greater simplicity and, particularly, greater dependability.

These same superiorities are needed for Automatic Temperature Regulation, whether the method of heating be the oil burner, or the fuel be coal or gas.

Therefore recommend Honeywell Controls to your customers, no matter what method of heating they select or what kind of fuel they burn.

The Honeywell Heating Specialties Co.
Wabash, Indiana

HONEYWELL
Temperature Regulators

Athey

(Patented)

Cloth-Lined Metal Weatherstrip

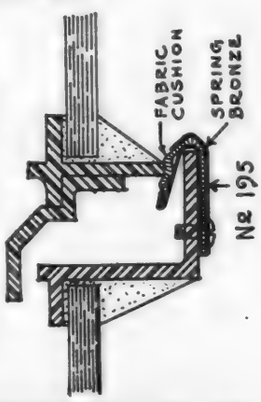
Other Weatherstrip Can't Be as Efficient as the Athey

The most common weatherstrip is a one-piece zinc strip provided with a rib which fits into a slot cut in the edge of the sash. Such strip ***can't be effective*** because both upper and lower sash are deeply grooved, for one-third of their height, to take care of sash cord—hence such weatherstrip provides no protection for one-third the height of the window. And the part that is "fitted" must be loose enough to allow for the swelling of wood in damp weather.

The two-piece metal weatherstrip provided a vast improvement over the one-piece type. But it has been found that when the two pieces of metal are fitted tight enough to prevent infiltration of air they create too much friction, and the free operation of the sash is retarded when the wood swells.

For Wood or Metal Windows

Sketch shows Athey Cloth-Lined Metal Weatherstrip for drawn steel windows. Notice the *cloth and spring bronze contact.* Athey is the **only** cloth-lined metal weatherstrip made, and experience has proved that a cloth-to-metal contact is the only one that actually "seals" the windows without making them stick.



The patented Athey *Cloth-Lined* Metal Weatherstrip overcomes all the disadvantages of these other types. For the cloth-to-metal contact provides a perfect "seal" against drafts and dust—yet is sufficiently pliable to prevent the sash from sticking. Furthermore the efficiency of the Athey strip is not dependent upon the fit of the sash. For even when the windows are loose Athey strip provides a perfect seal and also overcomes all rattle.

Write for complete information and prices

Athey Company

6027 West 65th Street - Chicago, Illinois

In Canada: CRESSWELL-McINTOSH, Reg'd.
270 Seigneurs St., Montreal, Que.

Athey Products

SEE OUR CATALOGUE IN SWEETS

Perennial Window Shades Disappearing Partition
Skylight Shades Cloth-Lined Metal Weatherstrips

First National Heating and Ventilating Exposition

March 17th to March 23rd inclusive, 1926

NEW MADISON SQUARE GARDEN—NEW YORK

EIGHTH AVENUE—FORTY-NINTH TO FIFTIETH STREETS

This is the Building in which this EXPOSITION will be held. Best equipped and most centrally located Exposition Building in New York City and within itself contains the very latest and best in the way of Heating, Ventilating, Plumbing, Refrigerating and Illuminating Equipment.

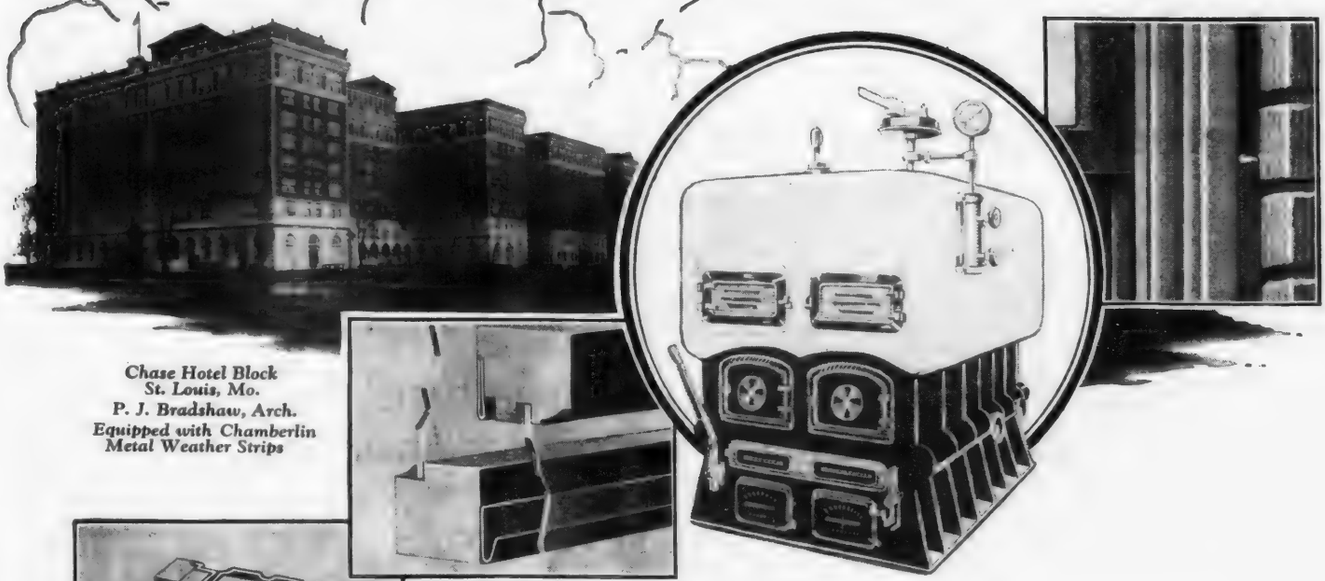
THIS IS YOUR TRADES' EXPOSITION in which you should be represented.

For reservation and particulars apply to the

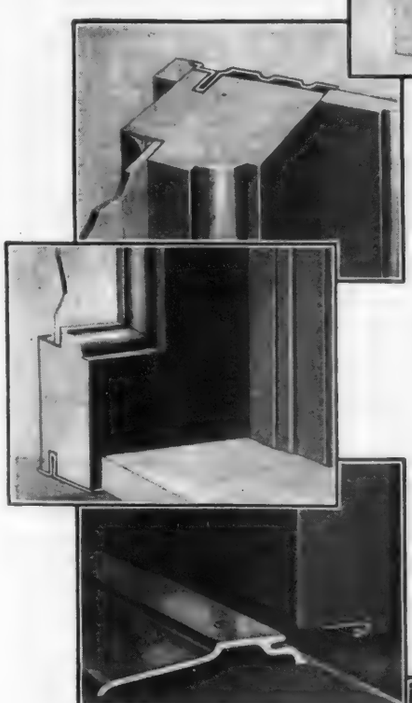
COMMITTEE HEADQUARTERS,
FIRST NATIONAL HEATING AND VENTILATING EXPOSITION

Suite 334—Hotel McAlpin, New York City
Telephone Pennsylvania 5700 Extensions 332-334-336

Give the Heating Plant a "Square Deal"



Chase Hotel Block
St. Louis, Mo.
P. J. Bradshaw, Arch.
Equipped with Chamberlin Metal Weather Strips



HAS IT EVER occurred to you why homes and buildings are cold or unevenly heated in spite of standard and efficient heating plants? In the great majority of such cases, uncontrolled air infiltration is the disturbing factor.

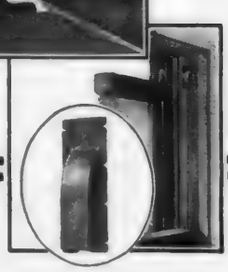
At a wind velocity of only fifteen miles per hour, the inleakage per foot of crack per hour around the average unstripped window or door, including the meeting rail, is 155 cubic feet.

Chamberlin Metal Weather Strips, Door Bottoms and Calking stop 85 to 95% of this infiltration—they aid the heating plant in maintaining an even temperature—saving 20 to 40% of fuel costs.

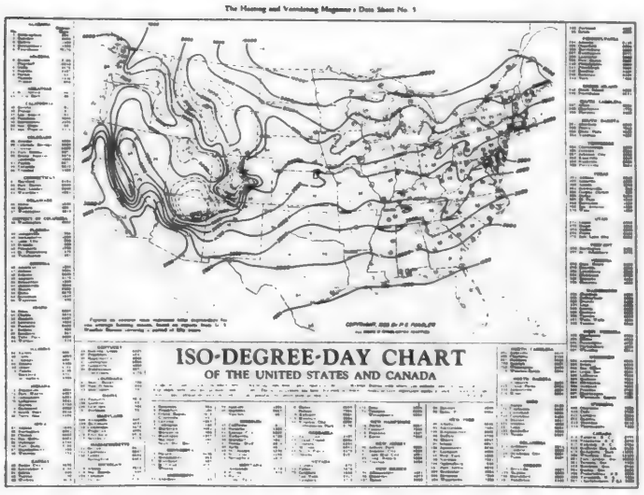
The Chamberlin service policy and life-of-the-building guarantee is positive insurance of permanent and satisfactory results.

CHAMBERLIN METAL WEATHER STRIP CO.
West Lafayette Blvd., Detroit, Michigan

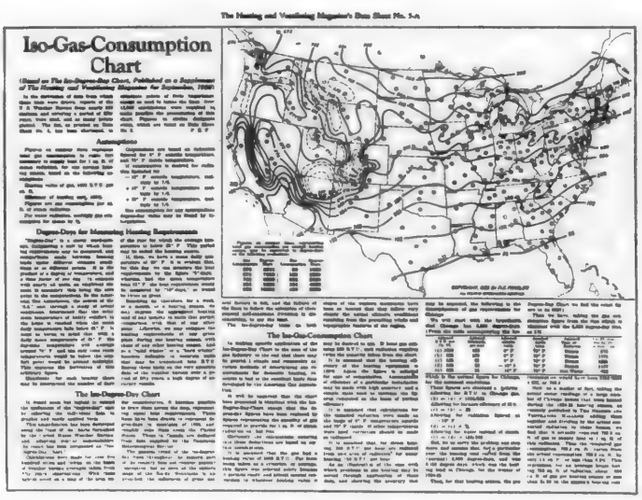
80 Sales and Service Offices Throughout the United States



CHAMBERLIN METAL WEATHER STRIPS
"SINCE 1893-THE STANDARD"



The Iso-Degree-Day Chart



The Iso-Gas-Consumption Chart

Know Your Heating Load and Fuel Costs

for any locality in the United States with

Coal, Gas, Oil

The Iso-Degree-Day and Fuel Charts

Four charts, each 10 x 15 in., bound together, with stiff cover and accompanied by full instructions

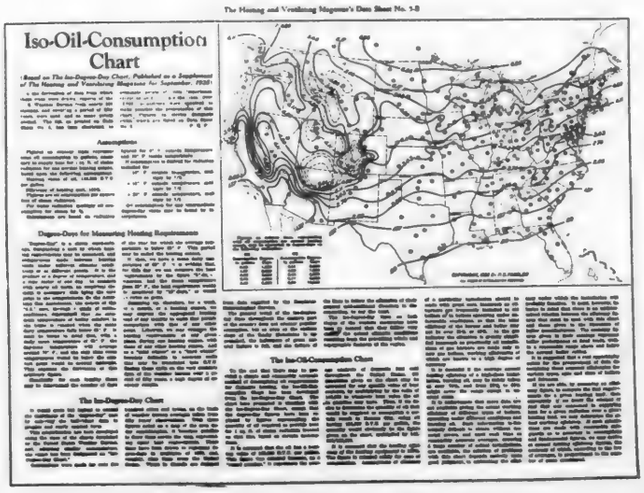
PRICE PER SET, $1.00

What hitherto has been a matter of guesswork has been reduced to definite quantities. The "heating load" for any locality may be stated in terms of "degree-days," just as the ability of a steam engine or electric motor is expressed in horse-power.

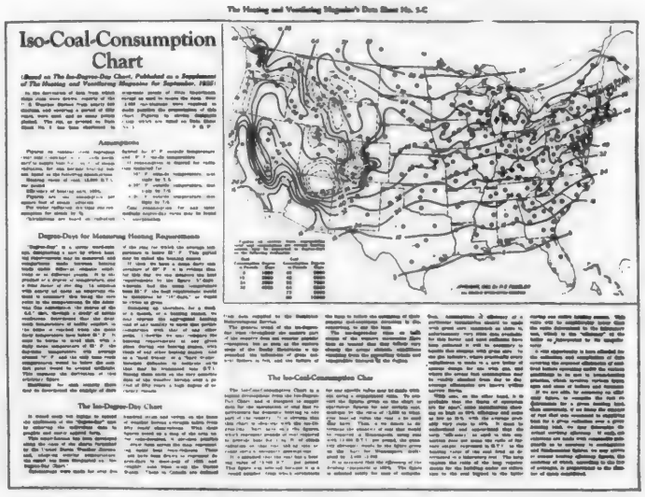
A further step translates this heating load into the pounds of coal, cubic feet of gas or gallons of oil fuel necessary to provide heat for 1 sq. ft. of radiation for a complete heating season.

The development of these charts involved thousands of calculations based on data furnished by the United States Weather Bureau, and they have been characterized as the most important single contribution in recent years to the science of heating.

Heating and Ventilating Magazine Co., 1123 Broadway, New York



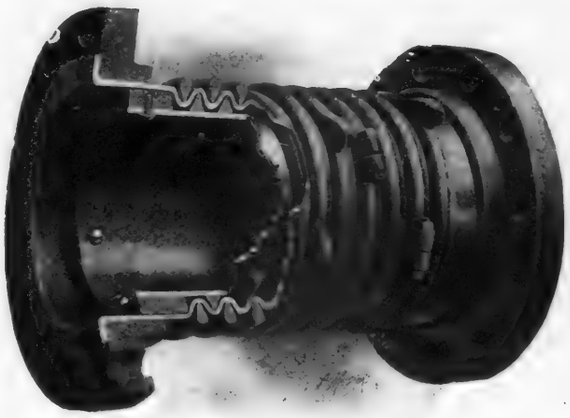
The Iso-Oil-Consumption Chart



The Iso-Coal-Consumption Chart

The Wainwright Improved Expansion Joint

Suitable for Pipe Movement of 1½ to 2 inches



Wainwright Improved Expansion Joint

THESE fittings are of the packless type—no stuffing box to be continually adjusted—no packing to blow out, deteriorate and require frequent replacement. The multiple corrugated copper expansion tube of uniform thickness and strength absorbs the movement.

Outside AND INSIDE expansion equalizing rings assure equal distribution of movement among the several corrugations.

The joint is protected from erosion and abrasive wear by the inner hard brass or copper sleeve which also affords smooth passage with least friction loss to steam, water, or gas being handled.

We will appreciate the opportunity of discussing special problems. Bulletin V-46, containing sizes, rating tables and layouts for typical installations, as well as information on Wainwright Anchors and Guides, will be sent on request.

WHEELER CONDENSER & ENGINEERING CO.

149 Broadway, New York

Works - CARTERET, N.J., NEWBURGH, N.Y.

Hot Water—

Stored till you need it;
Delivered as fast as you want it

G-R Instanta Storage Heater

(Patented)

Stores a tankful of hot water against sudden draws.
Gives hot water instantaneously when required.
Has tremendous overload capacity.
Occupies less space and requires less piping than an instantaneous heater and separate storage tank for the same duty.
Is built to eliminate strains on all parts and piping.

SEND THE COUPON FOR FULL INFORMATION

THE GRISCOM-RUSSELL CO., Dept. H., 285 Madison Ave., New York

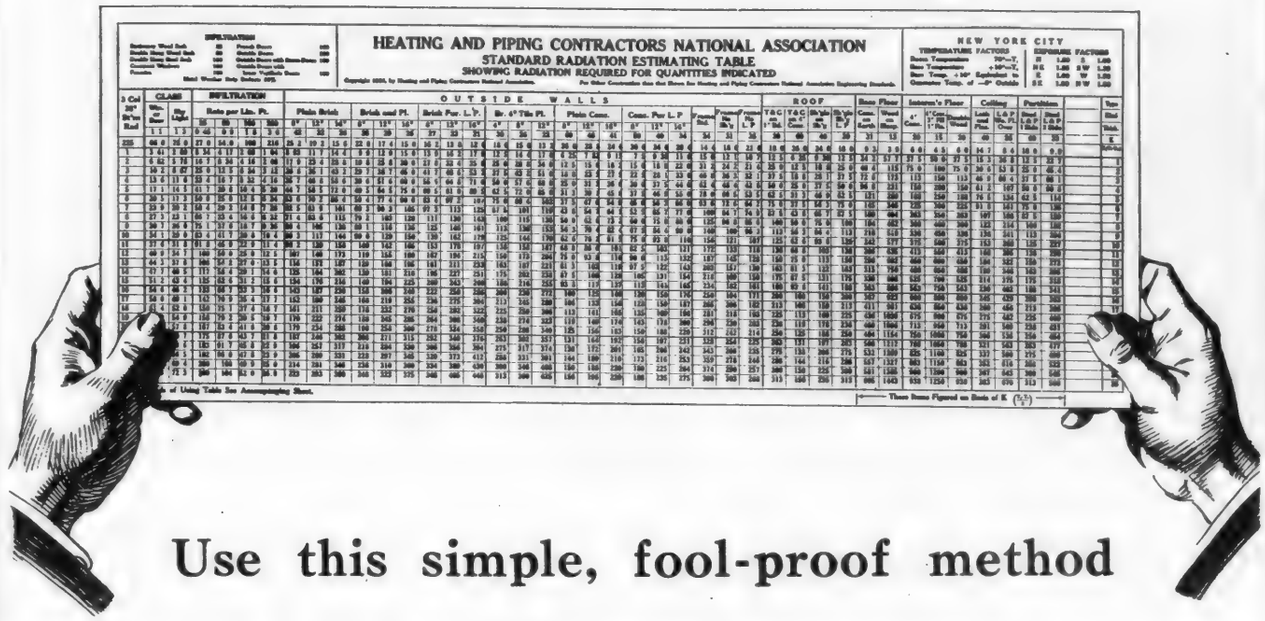
Branches in Twenty-three Cities
For Canada: Riley Engineering & Supply Co., Ltd., Toronto

Name.....
Company.....
Address.....

The Griscom-Russell Company, Dept. H., 285 Madison Ave., N. Y.
Please send me, without obligation, full information on the G-R Instanta Storage Heater.

H. & V. M. 2-26.

The successful heating contractor knows most about RADIATION



Use this simple, fool-proof method

Radiation tables for the following cities have been prepared by the Heating and Piping Contractors National Association:

Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
Denver, Colo.
Eastport, Me.
Kansas City, Mo.
Los Angeles, Cal.
Madison, Wis.
Memphis, Tenn.
Milwaukee, Wis.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
San Francisco, Cal
Salt Lake City, Utah.
San Antonio, Texas
St. Louis, Mo.
St. Paul, Minn.
Washington, D. C.

Note: If your city is not listed, request chart for city nearest to your locality.

THE successful heating contractor is the one who knows most about Radiation. His installations deliver **enough heat,** at the smallest fuel cost.

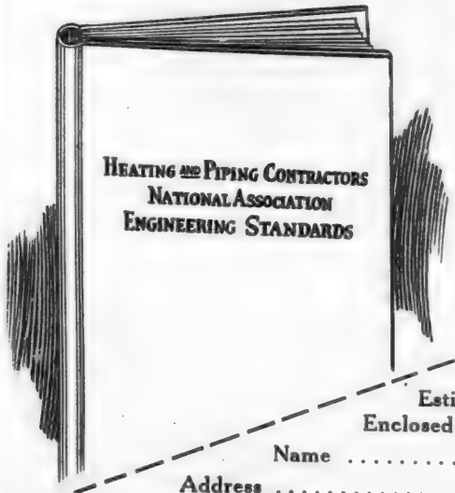
To determine the proper radiation in advance is no longer a problem, no longer guess work. The Heating and Piping Contractors National Association has reduced radiation estimating to a science—guess work and rule of thumb methods can be eliminated. The contractor need take no chances.

The Committee on Standardization of this nation-wide 37 year old organization of heating and piping contractors has expended over $100,000 in time and effort in an exhaustive study of radiation.

Complete radiation information is contained in a loose-leaf book entitled "Engineering Standards" and now made available to every heating contractor at a nominal cost of $5.00—a sum infinitesimal in comparison with its big value to the contractor.

All data to **figure radiation accurately** included: 151 constants for various types of construction and thickness of wall; infiltration factors and exposure factors are given.

Standard Radiation Estimating Tables for the twenty-four cities listed at the left are available in addition to this comprehensive book.



Limited Edition
Order Today

HEATING AND VENTILATING MAGAZINE,
1123 Broadway, New York, N. Y.

Date.....

Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Estimating Table for City of.....

Enclosed find check for $5.00 to cover cost and postage.

Name .....

Address .....

City and State.....

CORK LINED HOUSES MAKE COMFORTABLE HOMES

10° Below Zero and a 50-mile Gale Yet This Cork Lined House Was 72° Throughout

TEN below zero is *cold*. Add a 50-mile wind and the heating problem becomes serious.

Yet Dr. Jas. W. W. Walker's home in Auburn, N. Y., was comfortable in this kind of weather—72 degrees throughout. (Read his letter at the right.) The house is a remodeled 13-room structure set on high ground in the full sweep of the wind. Furthermore, it is heated by a boiler that is 31% smaller than would ordinarily be used in a house of this size.

But Dr. Walker's house is lined with Armstrong's Corkboard. That is why it is so easily heated. That is why an "undersized" plant keeps it comfortably and uniformly warm. The cork lining in the walls and ceilings holds the heat inside the house.

Every house insulated with Armstrong's Corkboard affords an opportunity to the heating contractor for better service and better business. The initial saving in the smaller plant required, its assured efficiency, and its lower fuel consumption reflect credit on you who install it. The economies you pass on to your customer react to your benefit, increase your business and your profit.

Every heating contractor has a vital interest in the relation between house insulation and heating. Be fully informed. Write for the book, "The Insulation of Dwellings with Armstrong's Corkboard," sent free on request. Address Armstrong Cork & Insulation Company (*Division of Armstrong Cork Company*), 202 Twenty-fourth Street, Pittsburgh, Pa. Canadian office, McGill Building, Montreal, Quebec. In London, Armstrong Cork Company, Limited, Sardinia House, Kingsway, W.C. 2.

AUBURN, NEW YORK
December 28, 1925.

Armstrong Cork &
Insulation Company,
Rochester, N. Y.

Gentlemen:

It may be of interest to you to read the enclosed newspaper clipping in today's "Citizen," stating that yesterday was the coldest [Dec. 27th] on record in Auburn: the temperature was 10° below zero accompanied by a 50-mile gale of wind. It will be further of interest to know that my house was perfectly comfortable, maintaining an average temperature of 72° throughout the house.

I feel this is as good a test as could be desired by anyone. Thanks to Armstrong's Corkboard, my house is all that can be desired from the standpoint of warmth.

Yours truly,

James W. W. Walker M.D.

Armstrong's Corkboard is made of pure cork in boards 12 inches by 32 or 36 inches—from 1 inch to 3 inches thick.

Reg. U. S. Pat. Off.

Branches in the Principal Cities

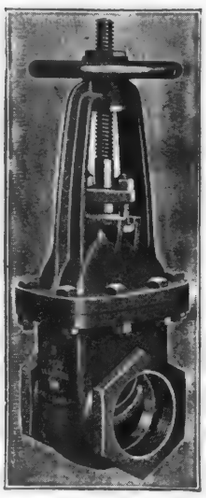
Armstrong's Corkboard Insulation

A Heatproof Lining for Walls and Roofs

IRON BODY GATE VALVES

SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS



ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings

Illinois Malleable Iron Company

1801 Diversey Parkway Chicago, Ill.

Instant Hot Water

DAHLQUIST AQUATHERM COPPER RANGE BOILER

A Device That Has Long Been Needed

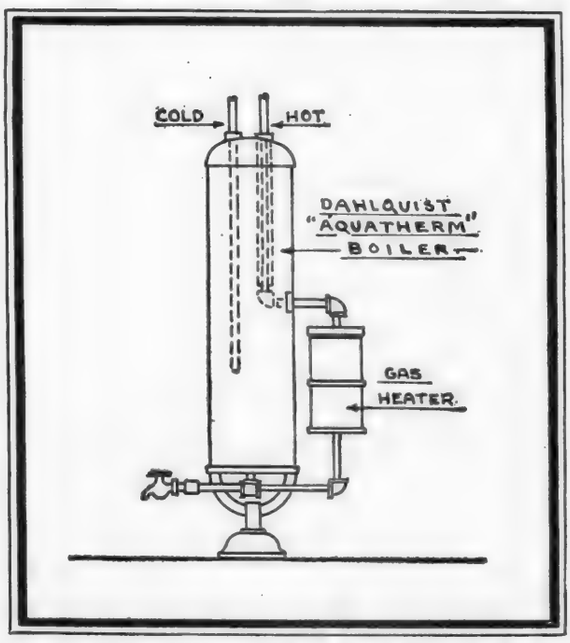
One of the most important developments in range boiler construction in many years is the DAHLQUIST AQUATHERM COPPER RANGE BOILER, which furnished to the consumer instant hot water at a minimum cost. It can be furnished in any size desired.

And the DAHLQUIST AQUATHERM can be furnished separately in proper size for any range boiler now installed.

Can be installed with any ordinary gas tank heater, water back in coal range, indirect heater, or coil in boiler or furnace, or electric heater.

Let us send full details

DAHLQUIST MFG. CO.
40 W. 3rd St. BOSTON, MASS.



Dahlquist Aquatherm Copper Range Boiler installed in connection with gas tank water heater in kitchen (note the simplicity and neat appearance of installation).

How a Central Heating Plant is Caring for Expansion in its Distribution Lines

—by using BADGER Self-equalizing Expansion Joints

The New York Steam Company, with approximately ten miles of steam main, is caring for its expansion requirements, one of its most vital problems, by the use of **Badger Self-Equalizing Expansion Joints.**

These **Badger Joints** are used throughout this job because they are capable of meeting all demands of expansion in a high pressure steam line. These include the provision against the most costly loss in furnishing steam—namely, **leaks. A Badger Joint** means a tight, permanent job.

Easy installation and minimum space requirements are also important features. Let us send full information regarding Badger advantages.

E. B. BADGER & SONS COMPANY

75 PITTS STREET, BOSTON, U. S. A.

Branch Offices in Principal Cities

ENGINEERS' SPECIFICATION INDEX

AIR COMPRESSORS.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

AIR CONDITIONING APPARATUS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Fleisher Co., Inc., W. L. New York.
Grinnell Company, Providence, R. I.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

AIR COOLING AND DRYING SYSTEMS.
Aerofin Corp., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York.
Fleisher Co., Inc., W. L., New York
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Spray Engineering Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

AIR ELIMINATORS.
Jas. P. Marsh & Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Midwest Air Filters, Inc., New York.

AIR FILTERS.
Cooling Tower Co., New York.
Duro Air Filter Co., Chicago, Ill.
Midwest Air Filters, Inc., New York.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.

AIR SEPARATORS.
Griscom-Russell Co., New York.
Hoffman Specialty Co., New York.

AIR WASHERS.
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., Inc., New York.
Fleisher Co., Inc., W. L. New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

BLOWERS
Fan.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Pressure.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Rotary.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Turbine.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

BLOW OFF BASINS.
Cast Iron.
Inland Iron Works, Joliet, Ill.

BOILER CEMENT.
Johns-Manville, Inc., New York.
Shur-Tite Mfg. Co., Norwood, Ohio.

BOILERS.
Down-Draft.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
General Boilers Co., Waukegan, Ill.
Hart and Crouse, Utica, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works, Titusville, Pa.
Universal Smokeless Boiler Co., R venna, O.

Heating.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
Bryant Heater & Mfg. Co., Cleveland, Ohio.
Burnham Boiler Corp., Irvington, N. Y.
Continental Heater Corp., Dunkirk, N. Y.
Frost Mfg. Co., Chicago, Ill.
General Boilers Co., Waukegan, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Gurney Heater Mfg. Co., Boston, Mass.
Handon Boiler Corp., New York.
Heggie Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Lebanon Boiler Works, Lebanon, Pa.
Niagara Radiator & Boiler Co., North Tonawanda, N. Y.
Oil City Boiler Works, Oil City, Pa.
Page Boiler Co., Wm. H., New York
Pierce, Butler & Pierce Mfg. Co., New York.
Standard Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., Newark, N. J.
Titusville Iron Works, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Universal Smokeless Boiler Co., Ravenna, O.
Utica Heater Co., Utica, N. Y.
Weil-McLain Co., Chicago, Ill.

Power.
Ames Iron Works, Oswego, N. Y.
Frost Mfg. Co., Chicago, Ill.
Heggie Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Sarco Co., New York.

COILS, PIPE.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Pecco, Inc., St. Louis, Mo.
Whitlock Coil Pipe Co., Hartford, Conn.

Air.
New York Blower Co., Chicago, Ill.

CONDENSERS.
Alberger Heater Co., Buffalo, N. Y.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Elliott Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

CONVERTERS, HOT WATER.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.
Wyckoff & Son Co., A., Elmira, N. Y.

COOLERS.
Oil.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING TOWERS.
Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.

COPPER BOILERS.
Dahlquist Mfg. Co., Boston, Mass.

COPPER KETTLES.
Dahlquist Mfg. Co., Boston, Mass.

COVERING PIPE.
American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville Inc., New York.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A, Elmira, N. Y.

DAMPERS, DUCT.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
York Heating & Ventilating Co., Philadelphia, Pa.

DEHUMIDIFYING APPARATUS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Engineering Corp., Newark, N. J.
Cooling Tower Co., New York.
Fleisher Co., Inc., W. L., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

DISTILLERS, (Water).
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.

DRAFT APPLIANCES.
Crown Fuel Saver Co., Richmond, Ind.
Wolff Coal Saver Co., Chicago, Ill.

DRYING SYSTEMS.
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, New York.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.

DUST COLLECTORS.
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F. Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.

ENGINES.
Steam, Automatic.
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.
American Blower Co., Detroit, Mich.
Ames Iron Works, Oswego, N. Y.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.
Hoffman Specialty Co., New York.

EVAPORATORS.
Boiler Feed Make-Up.
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.
Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass
Wright-Austin Co., Detroit, Mich.

YOUNG

CENTRIFUGAL VACUUM
AND BOILER FEED

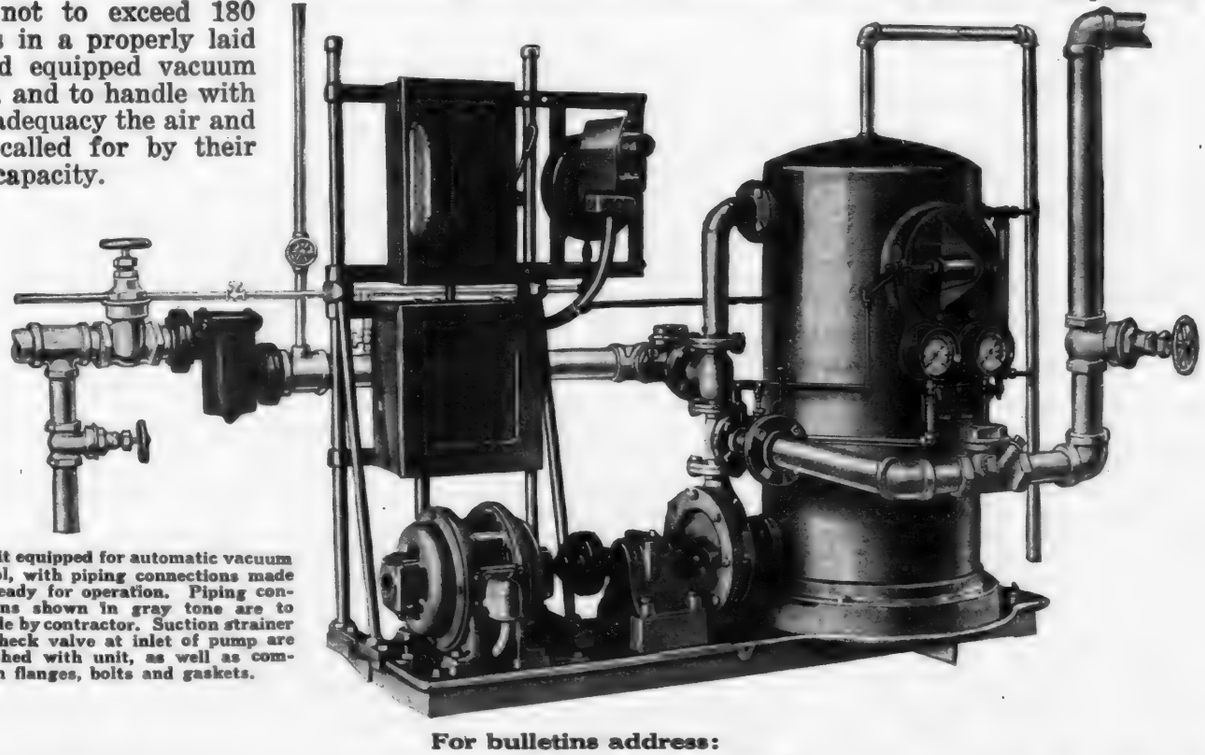
PUMPS

Supplied in Standard Units of Seven Capacities

Young Centrifugal Vacuum and Boiler Feed Pumps are furnished in seven capacities, ranging from 5,000 to 100,000 square feet of direct radiation, and built for 20 lbs. pressure at the pump as a standard. We also build special pumps of these same unit numbers to discharge against 35 pounds. Both standard and special units are furnished for either continuous operation or equipped with the type of automatic control best suited to the specific requirements.

The operating principle of the Young Pump, by which *one moving element* accomplishes the desired effect of a powerful suction and a positive pressure, is unique in its reliability, simplicity and high operating efficiency.

The improved construction, now marketed, produces ten inches of vacuum with a return temperature of water not to exceed 180 degrees in a properly laid out and equipped vacuum system, and to handle with entire adequacy the air and water called for by their rated capacity.



V2 unit equipped for automatic vacuum control, with piping connections made and ready for operation. Piping connections shown in gray tone are to be made by contractor. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

For bulletins address:

YOUNG PUMP COMPANY

230 East Ohio Street, Chicago

Factory: Michigan City, Ind.

ENGINEERS' SPECIFICATION INDEX (Continued)

EXHAUST SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

EXPANSION JOINTS.
American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.
Amercan Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS
Boiler
Kieley & Mueller, Inc., New York.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).
Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.
Davis Engineering Co., New York.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS
Groeinger Mfg. Co., Columbus, Ohio.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.
Franklin Gas Burner Mfg. Co., Cincinnati, O.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Altitude.
Pierce, Butler & Pierce Corp., New York.

Draft.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.
American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.
Bishop & Babcock Co., Cleveland, Ohio.

Vacuum.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).
Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Corp., New York.

Water.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES
Dumping
Pyramid Iron Products Co., New York.

Rocking
Pyramid Iron Products Co., New York.

Shaking
Pyramid Iron Products Co., New York.

Shaking and Dumping
Pyramid Iron Products Co., New York.

Shaking, Circular
Pyramid Iron Products Co., New York.

Stationary
Pyramid Iron Products Co., New York.

HEATERS.
Domestic Water.
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Bryant Heater & Mfg. Co., Cleveland, Ohio.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Everhot Heater Co., Detroit, Mich.
Excelso Specialty Works, Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit
Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).
Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.
Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.
Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed
Standard Heater Co., Williamsport, Pa.

Portable Unit Air.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Supreme Heater & Ventilating Corp., St. Louis, Mo.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.
"Gasteam".
James B. Clow & Sons, Chicago, Ill.

Vacuum.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mount Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Water.
Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Standard Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.

YEOMANS

YEOMANS PUMPS
GIVE YEOMAN SERVICE

HORIZONTAL AND VERTICAL
AUTOMATIC ELECTRIC

Condensation Pumps

A thorough investigation of this pump will reveal the best material, the finest workmanship, resulting in a noiseless, rugged, reliable product that will give dependable service for many years.

For automatically returning condensation to boilers from low pressure gravity steam heating systems.

Also manufacturers of Bilge Pumps, Centrifugal Pumps, Sewage Ejectors, Sewage Pumps, etc.

Engineers and architects may for the asking receive our condensation bulletin.

YEOMANS
BROTHERS COMPANY
1421 Dayton St., Chicago

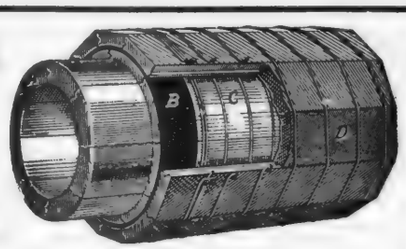
CENTRAL STATION STEAM CO.

2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF
Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

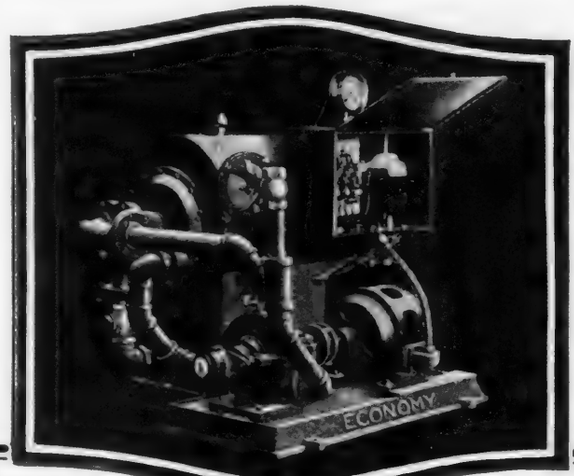
Wyckoff's Improved Cypress Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.



Type C. V. Fig. 2234—Single Model Vacuum Pumps

DEPENDABILITY

This is an essential requirement of all apparatus entering into the equipment of every worth while project.

Economy Centrifugal Vacuum Pumps

embody every requisite of high class equipment. They are well motored with ample reserve power. They never burn out, consequently shut downs are avoided.

They have ample air, water and pressure capacity.

They have longer life than other types.

They maintain their efficiencies.

They are scientifically designed.

They have the best thought of competent hydraulic and heating engineers built into them.

They require less attention and upkeep than other types.

They reduce noise in radiators and piping.

They operate quietly.

They use no more power than other pumps that do the same work.

They are guaranteed for performance and quality.

Representatives in Every Large City

Economy Pumping Machinery Co.

71-122 North Curtis St. CHICAGO

ENGINEERS' SPECIFICATION INDEX (Continued)

Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Ric-Wil Co., Cleveland, O.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.

Feed Water.

Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa

NIPPLE MACHINES.

Threading, Turning, Etc.

Bryant Sons & Co., O., Buffalo, N. Y.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS

Aetna Automatic Burner Co., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Combustion Fuel Oil Burner Co., Milwaukee, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Ideal Rotary Burner Co., York, Pa.
Johnson Co., S. T., Oakland, Cal.
Rayfield Mfg. Co., Chicago, Ill.
Wilde Co., W. B., Peoria, Ill.

OZONE APPARATUS.

United States Ozone Co., Scottdale, Pa.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Elliott Co., Jeannette, Pa.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.

Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATOR MACHINERY.

Bryant Sons & Co., O., Buffalo, N. Y.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
Lyon Products Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Standard Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Co., H. W., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind.
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J.
Elliott Co., Jeannette, Pa.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

SEPARATORS.

Oil.

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SPRAY COOLING SYSTEMS.

Bayley Mfg. Co., Milwaukee, Wis.
Cooling Tower Co., New York.
Massachusetts Blower Co., Watertown, Mass
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

SPRINKLER HEADS

C. S. B. Sprinkler Co., Boston, Mass.

STOKERS

CombustiKator Co., Chicago, Ill.

STRAINERS.

Oil.

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.

Steam.

American Dist. Steam Co., No. Tonawanda, N. Y.
Dunham Co., C. A., Chicago, Ill.
Eliott Co., Jeannette, Pa.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.

"Buffalo" Announces a New Sump Pump

You will want full information about the new Buffalo Sump Pump which has recently been placed on the market.

Features of this new pump are its simplicity, efficiency and its low price.

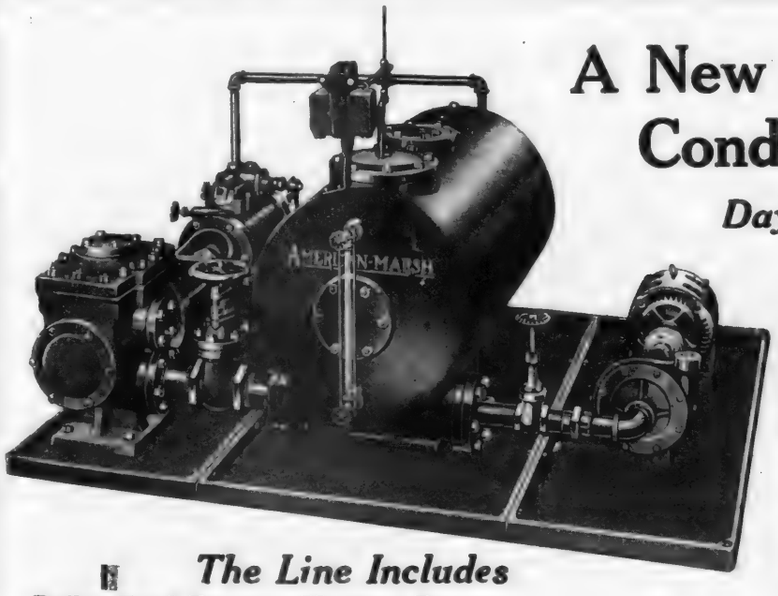
The introduction of this pump marks the establishment of a new standard in sump pump construction.

Improved—Lower In Price

Although of an improved design, production economies enable us to sell this pump at a remarkable low price. Write for particulars.

Buffalo Steam Pump Company

480 Broadway **BUFFALO, NEW YORK**



A New American Marsh Condensation Pump

Day and Night Service

This new Condensation Pump is designed for use where there is a wide variation in steam pressure. When the steam pump stops operating because of lack of steam pressure a motor driven centrifugal pump, which is controlled automatically, keeps the return lines free from condensation. This is important for it keeps the return lines clear and continues to operate until enough steam is generated to operate the steam pump. It is really a day and night pump. Practical, efficient and economical.

Write for Bulletin No. 58

The Line Includes

Boiler Feed Pumps—Vacuum Pumps.
Hot Water Circulating Pumps.
Sump or Bilge Pumps.
Condensation Pumps, steam and motor driven, vertical and horizontal.
Automatic Boiler Feed Pumps and Receivers.

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 926 Monadnock Block **NEW YORK OFFICE: 17 Battery Place**

ENGINEERS' SPECIFICATION INDEX (Continued)

Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.

TRAPS.

Radiator.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.
American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.
American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Davis Engineering Co., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Elliott Co., Jeannette, Pa.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.
American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).
American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.
Elliott Co., Jeannette, Pa.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.
American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Globe, Angle and Cross.
Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.
Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.
Klippel Mfg. Co., Chicago, Ill.

Non-Return.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.
American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.

Regulating.
American District Steam Co., No. Tonawanda, N. Y.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.
(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilating Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park. Mass.
York Heating & Ventilating Co., Philadelphia, Pa.
(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilating Co., New York.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

VENTILATORS.

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Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

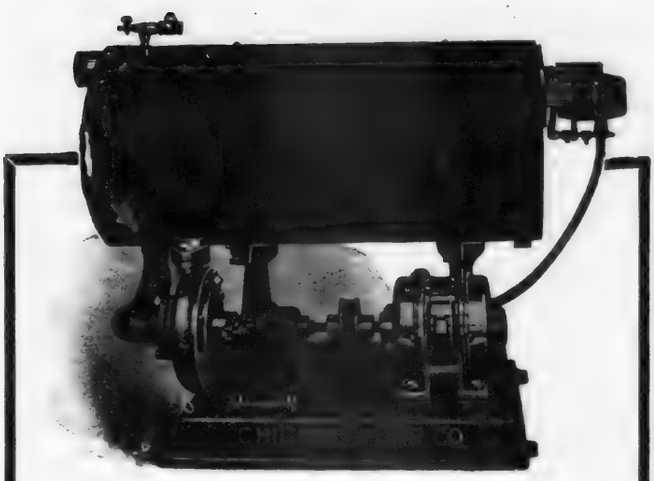
Mushroom.
Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York.
Lyon Products Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Richmond Air Equipment Co., Richmond, Va.
Sturtevant Co., B. F., Hyde Park, Mass.

WEATHER STRIPS.

Metal.
Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

WELDING MATERIALS.

Linde Air Products Co., New York.
Oxweld Acetylene Co., Long Island City, N. Y
Prest-O-Lite Co., Inc., New York.



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Write for bulletin No. 129 which describes this unit in detail.

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Manufacturers of Quality Centrifugal Pumps for Every Service

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SEWAGE — FIRE
BOILER FEED — CIRCULATING

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H. & V.-12-25-RM

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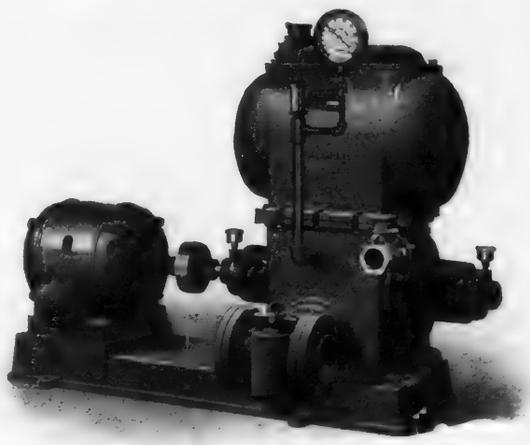

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Units that have been in service four heating seasons show the same efficiency that was shown when installed.

The new type offered retains all the advantages of those now in service, the change in design being in the casing to secure a more compact and sturdy unit.

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SKIDMORE CORPORATION

General Offices and Factory

1535 Dayton St. CHICAGO, U. S. A.

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3,000 People Supplied with Hot Water in the Singer Building

It is no small responsibility to select equipment for a skyscraper like the Singer Building. The engineers and architects who specified "Patterson" Hot Water Heaters for this gigantic building many years ago, knew that most of the world's finest buildings and manufacturing plants were equipped with Patterson Hot Water Heaters and that they were, therefore, taking no chances in installing

Patterson Hot Water Heaters

That they made a wise selection is proven by the fact that recently when an additional hot water heater was needed for the Singer Building, they installed another Patterson.

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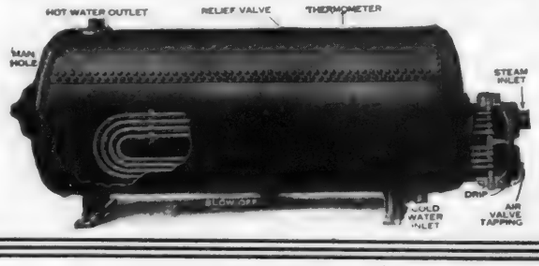
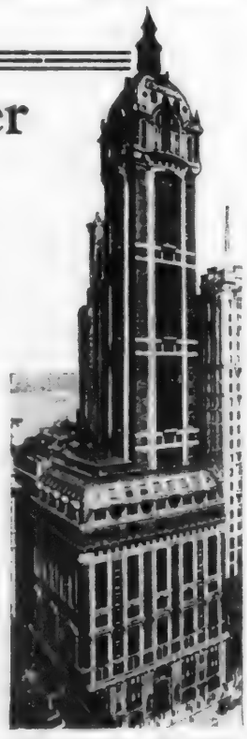


Specify the "Patterson" and you will never have cause for regrets.

Our interesting catalog sent on request.



Singer Building, New York
A. P. NOWELL, Architect

The Patterson-Kelley Co.

107 East 40th St., New York City

Gurney

Sectional Boilers
Steam and Water
900 Series
Additional Prime Heating Surface

During the long period of over 50 years in which Gurney Boilers have been made they have not only met the demands of the time, but, by constant effort toward the accomplishment of greater efficiency, our engineers have always been able to embody in Gurney Boilers certain exclusive features affording economy, convenience and better performance.

In the 900 Series Boilers one of the outstanding features is greater heating surface. This additional prime heating surface is effected by the water legs, as shown in the accompanying illustration.

Gurney Sectional Boilers are built of highest grade pig iron, give long and continuous service and embody many exclusive advantages. And there is a type for every requirement, from the residence to the large installation, requiring a battery of two or more boilers. **Send for catalog.**

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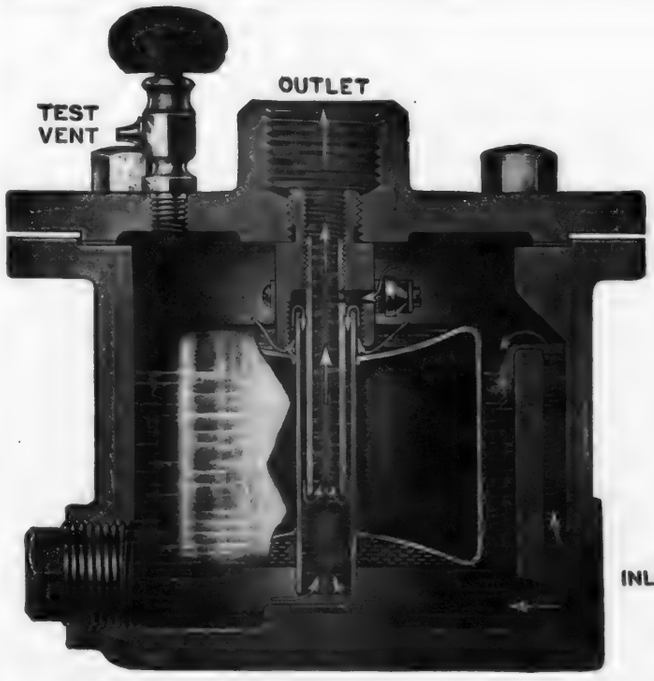
GURNEY HEATER CO., INC., New York, Manly St., Cor. Anable Ave., Long Island City
GURNEY HEATER M'F'G CO., Richmond, Va., 418 East Main St.
GURNEY HEATER CO., INC., Philadelphia, 108 North 17th Street



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DUPLEX WATER SEAL LOW PRESSURE
BLAST TRAP

for direct or indirect coils or any location where large quantities of water are to be discharged

Operates automatically either with or without mechanical suction on return line.

No complicated parts to stick or get out of order.

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Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents
Indicating and Recording Gauges

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(1915)

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(1925)

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STEEL HEATING BOILERS
PACIFIC
WAUKEGAN ILLINOIS

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STEEL HEATING BOILERS

KEWANEE

Steel Boilers

—*there's more in them*

The Kewanee Boiler Company are not philanthropists. We don't use a lot of extra steel in a boiler just to make it look big, or to help the steel makers along.

But we *know* that we must put a certain amount of steel in a boiler, and make it sufficiently big, so that *you can get the heat you want from it.*

That's why Kewanee Boilers are bigger and weigh more than a lot of others.

BY INVITATION MEMBER OF

NEW YORK, U. S. A.

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THATCHER

BOILERS · FURNACES · RANGES

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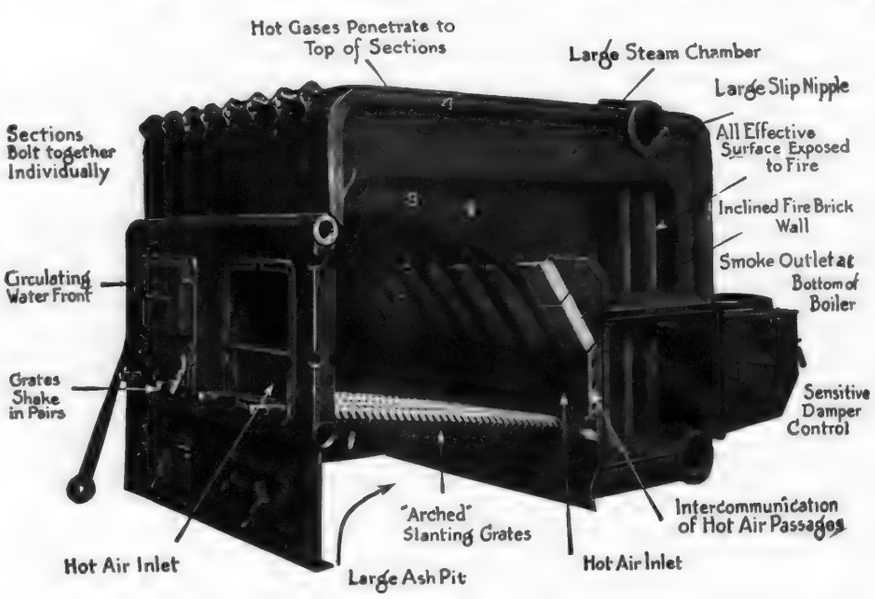
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Intercommunication of Hot Air Passages
Hot Air Inlet
"Arched" Slanting Grates
Large Ash Pit
Hot Air Inlet
Sections Bolt together Individually
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Grates Shake in Pairs

1st—For carefree, solid comfort through the severest weather.

2nd—For economy in fuel expense. Through correct application of complete combustion practically all of the fuel used, whatever its nature, goes into useful steam.

3rd—For inexpensive installation. Convenient for basements with low ceilings because of its low water line feature which also allows the use of small mains thereby cutting costs.

Catalog 23 gives many more answers. Send for it.

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General Office and Factory—North Tonawanda, N. Y. — Branch Office and Factory—Chicago, Ill.

NIAGARA LOW WATER LINE SMOKELESS BOILERS

Sales Representatives!

Who call on Building Owners
Contractors and Architects

there is money for you in

Wolff
Draft Conditioners

We want a man (or concern) in every City where we are not now represented to handle the sale and installation of Wolff Draft Conditioners—**the fuel saving device that has made-good in every respect.**

If you call on owners, contractors and architects it will fit in with your present work, and will not conflict with any heating specialty you now handle. It will give you another profit-paying line which can be sold at the same time you sell other heating items.

We say Wolff Draft Conditioners have "made good" because we can prove it. For instance: In the city of Chicago we have installed some 5300 jobs. They were installed on a written guarantee to save fuel.

They must have done everything we claim they will because in a period of nearly 10 years none have been removed.

Drop us a line for full particulars. Or come to Chicago and let us show you actual installations in many of Chicago's finest buildings.

Wolff Coal Saver Co.

1336 West Congress St., Chicago

GUARA
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For
INTERNATIONAL BOILERS
Round—Sectional—Smokeless

GUARANTEE

WE guarantee INTERNATIONAL ECONOMY steam and water boilers to maintain 2 pounds steam pressure, or 180° temperature at the boiler, on the guaranteed amount of direct cast iron radiation shown for each size. Additional loads such as domestic hot water supply, direct-indirect and indirect radiators, blast coils, or rooms to be maintained below 70° temperature, must be reduced to and included in equivalent square feet of direct cast iron radiation.

This guarantee is based on fuel of at least 11,500 B. t. u. and a chimney providing sufficient draft to properly burn the fuel.

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Branches and Warehouses at:
NEW YORK CHICAGO CLEVELAND DETROIT NASHUA, N. H.

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N LOADS

For
INTERNATIONAL BOILERS
Round—Sectional—Smokeless

WHAT YOU ASKED FOR

THE Architectural Profession, Heating Engineers and Steamfitters for years have keenly felt the need of definite reliable information regarding Boiler ratings. INTERNATIONAL Guaranteed Radiation Loads enable you to make an immediate and accurate selection of boiler size with all guesswork eliminated. Proper allowance has already been made to cover piping mains and risers.

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Branches and Warehouses at:

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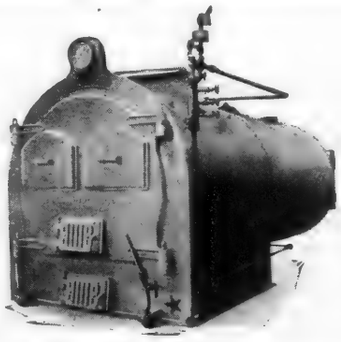
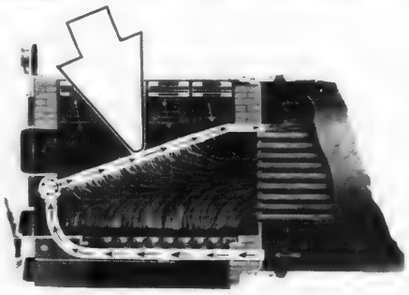


This boiler is a marvel

Check any other against its 17 definite money saving features

1 In installation this boiler can be ready for firing in 3 to 4 days.
2 Space for installation need not be large. The boiler is very compact.
3 A 45 inch water line in small sizes to 77 inch in large minimizes excavating costs.
4 No outside bricks necessary. Standard bricks used inside and only a comparative few needed.
5 This boiler shows an efficiency of 70% against an HRT type of the same rating showing 60%.
6 Down draft furnace insures perfect combustion of fuel.
7 There are no air leaks—a source of wasted heat and unnecessary cost.
8 Radiation losses are slight.
9 The boiler is a quick steamer. Firemen report almost unbelievable records.
10 Stack temperature is exceptionally low—definite proof of efficiency.
11 Smokeless.
12 **Rapid water circulation. Cut shows how this highly desirable feature is maintained. Fast water does not allow scale to collect or sediment to settle. Every one of the 17 features of this boiler are definite money saving features to be emphasized as strongly as this one.**



13 No stay bolts to corrode or collect water deposits.
14 No crown sheet to bag and burn out.
15 No mudlegs and the troubles they eventually bring.
16 Fire door at a height that permits firing with least amount of fatigue.
17 Easy to clean. Entire front of boiler is a door . . . swings open and boiler is immediately accessible for cleaning.

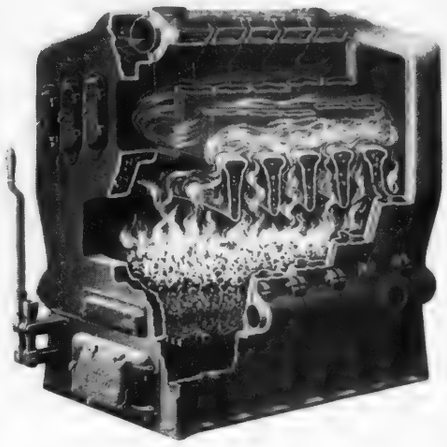
Pamphlet covering these 17 points in detail will be sent all interested engineers, plant superintendents and owners. Write Dept. D3. You'll find information highly illuminating and informatory.

STANWOOD
Smokeless
BOILERS

Working pressures 15 to 200 lbs. Sizes 29 to 210 H. P.

THE STANWOOD CORPORATION

ESTABLISHED 1891 CINCINNATI



Long Three-Way Fire Travel

On Each Side of the Boiler

It means that you get the heat before the chimney gets it.

You get it in the form of steam or hot water. And you get it quick—when the boiler is a

BURNHAM

Square Sectional Boiler

Another economy feature:—In mild weather only the front half of the grate need be used. It operates in two sections. Keeping the flues clean is also easy; there's a door for each flue. All operating parts are in front. Sections can be added to either the front or rear. Complete information in Burnham Catalog. Send for it.

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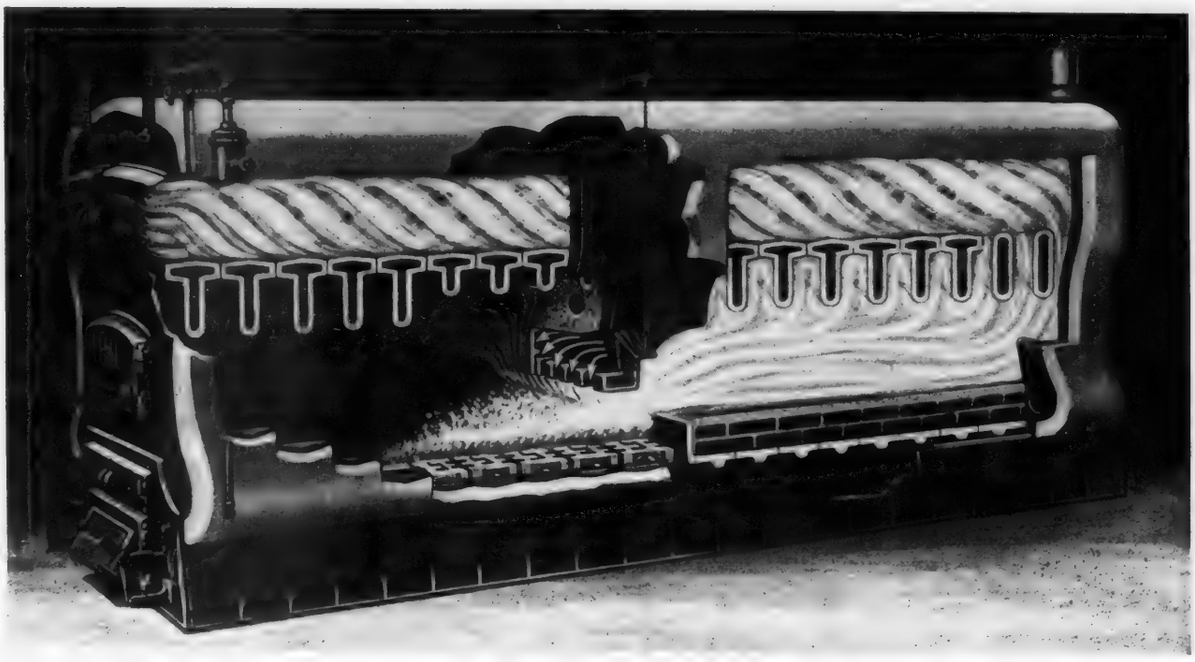
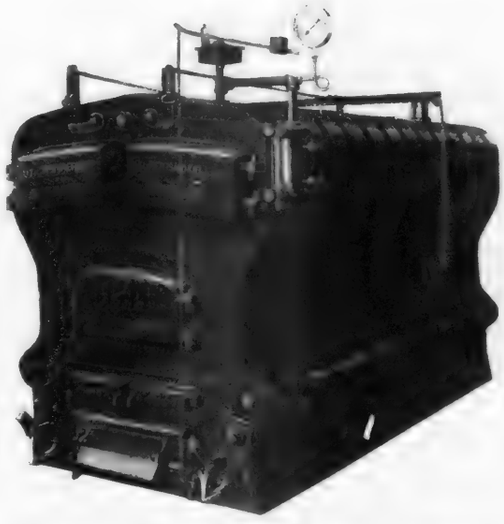
Representatives in all Principal Cities

Canadian Offices:
Harbor Comm. Bldg., Toronto
124 Stanley St., Montreal



Cutaway View of Utica-Imperial SUPER-SMOKELESS Boiler

Protection Against The Heat Thief—SMOKE



Exterior View of Boiler Showing Air Inlet

IN BURNING soft coal, about one-third of the heat value of the fuel is ordinarily wasted in the form of smoke. The volatile matter distilled from the fire is allowed to escape up the chimney in costly clouds. This means a loss of heat units of the coal and a waste of the money which pays for it just as surely as if the owner were heating his bui'ding with a merry little blaze of dollar bills.

SUPER-SMOKELESS Boilers prevent this waste by burning smoke and soot as valuable fuel. They eliminate the smoke nuisance and cut the coal bill, by utilizing ALL OF THE FUEL to obtain maximum heating efficiency. In addition to burning soft coal smokelessly and with the greatest economy, they have proved remarkably efficient for oil-burning and will utilize successfully hard coal, coke and other fuels—thus protecting the owner against any fuel emergency. For these reasons, SUPER-SMOKELESS Boilers are the best investment your customers can make.

UTICA—IMPERIAL

SUPER-SMOKELESS-BOILERS

Manufactured by the

UTICA HEATER COMPANY, UTICA, N. Y.

Sales Offices in the Principal Cities

Get this New Book!

The Sure way to profit!

WRITE for our new profusely illustrated catalog. It's filled with interesting information that will help you increase your sales. By giving your customers more efficient heating at lower cost, you will have a tremendous advantage over your competitors. Don't delay—find out all about Thrush System. Write now.

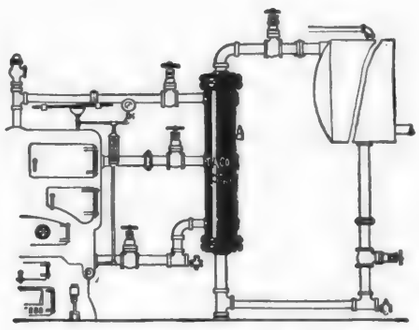
Send for Catalog

H.A. Thrush & Co.

PERU, INDIANA.

Do you take your money out of the bank and burn it?

Taco Semi-Indirect Water Heaters are for attachment to the steam heating boiler for the purpose of heating the Domestic hot water supply. These heaters have three connections to the boiler; two below the water line, and one above. Capacities range from 50 to 2000 gallons an hour.



"It Saves the Cost of an Extra Fire"

Are you interested? The Aron Leasing Corporation were--and then wrote us---*"This Taco Heater has been in use for almost a year, and we have never had any trouble or complaints with our hot water supply during that time."*

TACO
WATER HEATERS

Manufactured and Guaranteed by

Thermal Appliance Company

342 Madison Avenue New York City

OVER 1500 TITUSVILLE BOILERS

are installed in New York loft Buildings alone

The fact that Titusville Boilers are pre-eminently adapted for loft building service is proven by the fact that more than 1500 have been installed in loft buildings in New York City.

A large number of these have been serving for more than 25 years and are continuing to render satisfactory service.

Titusville Boiler Catalog No. 85 should be in the hands of every Heating Contractor and Architect.

THE TITUSVILLE IRON WORKS CO.

TITUSVILLE, PENNA.

SALES OFFICES

New York
152 West 42nd Street

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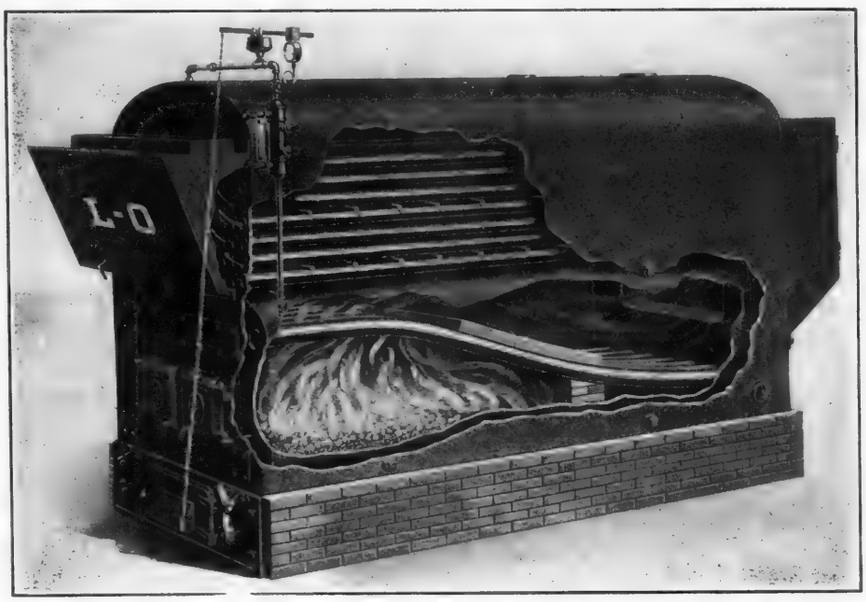
Woodward Building

Buffalo, N. Y.
Marine Trust Bldg.

Chicago, Ill.
1124 Harris Trust Bldg.

LEBANON L-O BOILERS



SAVES INSTALLATION COST

Shipped assembled complete, viz., bolted to its own steel base, with grates, bridgewall, and refractory combustion arch all securely installed, ready for operation.

Write for copy of Test Report and Bulletin

LEBANON BOILER WORKS

J. K. PETTY & CO., Inc., Proprietors

PHILADELPHIA OFFICE
507 Harrison Bldg.
(15th and Market Sts.)

Main Office and Works
LEBANON, PA.

Koithan & Pryor, Representatives
39 Cortlandt St., NEW YORK CITY

Representatives in Principal Cities

Pyramid Grate Installation Spells Satisfaction

The Key Note of Results

WHILE EFFICIENCY IS BEST SHOWN IN PRACTICE

	Carteret Club Jersey City, N. J.	Rutherford, N. J. High School	Rutherford, N. J. Park School
Without Pyramid Grates			
Coal Burned (1923-24)	201 tons Egg	250 tons Egg	135 tons Egg
Cost	$2859.49	$3375.00	$1822.50
With Pyramid Grates			
Coal Burned (1924-25)	156 tons Rice	190 tons Rice	105 tons Rice
Cost	$993.78	$1045.00	$577.00
Saving with Pyramid Grates			
Tonnage Saved	45 tons (24%)	60 tons (24%)	30 tons (22%)
Money Saved	$1866.71	$2330.00	$1245.00

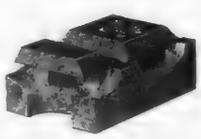
The above installations paid for themselves in savings in less than one heating season.

PYRAMID IRON PRODUCTS CORPORATION

Sole Manufacturers of the PYRAMID GRATE

Main Office: 136 LIBERTY STREET NEW YORK

Representatives:
Albany Foundry Co., (Fdry.), Albany, N. Y.
Emery Caldwell, 40 Franklin St., Auburn, N. Y.
Hanson & Parker (Fdry.) 50 Congress St., Boston, Mass.
Sprague Ice & Coal Co., Bridgeport, Conn.
Manufacturers Selling Co., Trenton, N. J.
W. P. Mackenzie Co., 1234 Calowhill St., Philadelphia, Pa.
Riley Engineering & Supply Co., (Fdry.) 360 Dufferin St., Toronto, Canada
Frank D. O'Keeffe, Riverhead, L. I.



"I am advising and installing a number of SPENCER HEATERS because of first-hand experience with one in my own residence.

"The advantages of a heater that will run from morning to night, without attention, saving at least $5.00 a ton . . . . . put an ordinary heater out of the running.

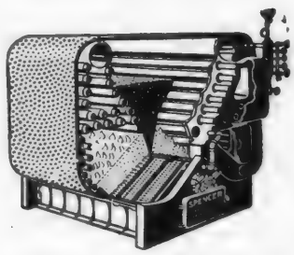
"Such talking points take the heating contractor out of the low-price competition and give him an article with merit to sell at a profitable figure."

This letter from a Brooklyn heating contractor is typical of many received from the hundreds of other heating contractors who, like him, are finding in Spencer Magazine Feed Heaters the means to an increasingly profitable and satisfactory business.*

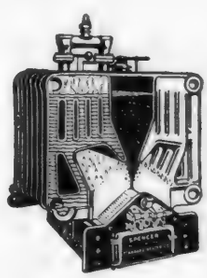
*Name on request.

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat coal

SPENCER
Single Grate Heater



SPENCER Steel Tubular Heater
for large installations



SPENCER
Double Grate Heater

A size and type for every purpose *Sold only through heating contractors*

STANDARD HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Washington Detroit Schenectady Syracuse Harrisburg Scranton

Evenheat

A Gas Fired Hot Water Boiler

A complete Heating Unit For the Home

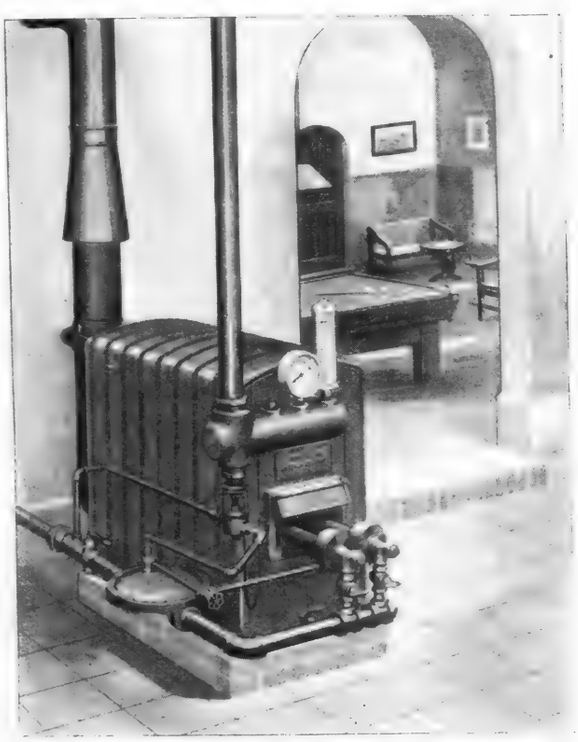
82.8% Efficient

The highest test on record, from Armour Institute Report.

Scientific Combustion Chamber — Revertible Heat Travel — Water Circulation — give supremacy to *Evenheat.*

Priced within reach of all. You can be the authorized dealer for your vicinity.

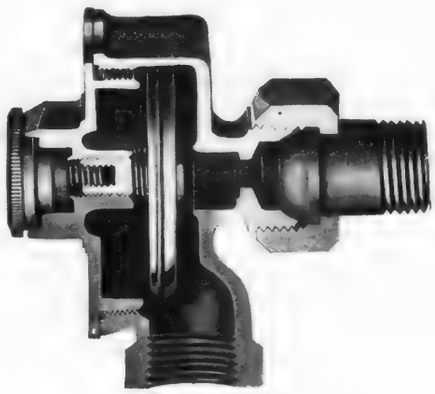
Write for our dealer proposition.



A modern basement

Evenheat Mfg. Co.

204 W. Lake St. Chicago



Built to put an end to trap troubles

The popularity of O-E Thermo-Nickel Return Traps is based on their superior design—a design that finally and decisively puts an end to trap troubles. Check these points:

Diaphragm made of high grade, non-corrosive metal, heavily corrugated and reinforced—deterioration is eliminated.

Free of condensation water at all times,—will not freeze or become damaged.

Cannot stick or bind because the flat disc closes against a semi ball seat.

Made in adjustable or non-adjustable pattern.

Self cleaning vertical seat.

Locking device prevents thermostatic member getting out of adjustment.

Tested by not less than 50 lbs. steam pressure and properly adjusted.

Guaranteed to remain closed at 0 to 25 lbs. steam and 0 to 15" vacuum.

These are a few of the outstanding advantages of O-E Thermo Nickel Return Traps. Let us send you further details.

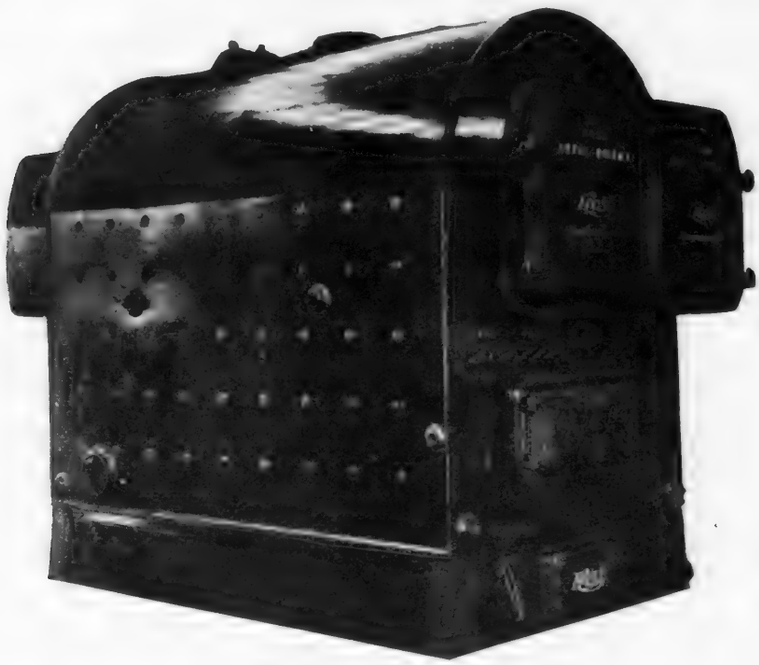
O-E SPECIALTY MFG. CO.

12 Keefe Avenue Milwaukee, Wis.

THE SEAL OF OE SIMPLICITY TRADE MARK

Heating Specialties

ROSS
STEEL BOILERS



Five Reasons Why You Should Investigate the Ross Boiler

1. COMPACTNESS

Which means a saving of space in high cost buildings.

2. EFFICIENCY

Scientific arrangement of heating surfaces for maximum absorption of heat.

3. ACCESSIBILITY

Designed so that all parts can be easily cleaned—the tubes can be reached from either head from the outside of the boiler.

4. CONSTRUCTION

Made of steel, electrically welded in accordance with the A.S.M.E. code for heating boilers.

5. PERFORMANCE

Quick steaming qualities are a feature of the Ross boilers with a corresponding saving in fuel.

WRITE FOR CATALOGUE

The Frost Manufacturing Co.

GALESBURG, ILLINOIS

75 YEARS OF QUALITY BUILDING

ALSO BUILDERS OF THE WELL KNOWN FROST HORIZONTAL RETURN TUBULAR BOILERS

Modern Pipe for Modern Apartments

THE day of better apartment buildings is here. A discriminating taste for something above the average of a few years ago has moved the building of apartments into the front rank of carefully planned and substantially erected structures. In keeping with the improvements in design, location and interior plan has come a corresponding demand for better structural materials. Nothing short of the most reliable materials can meet the purpose of the owner, the architect and the plumbing and heating contractor—and this is especially true of pipe.

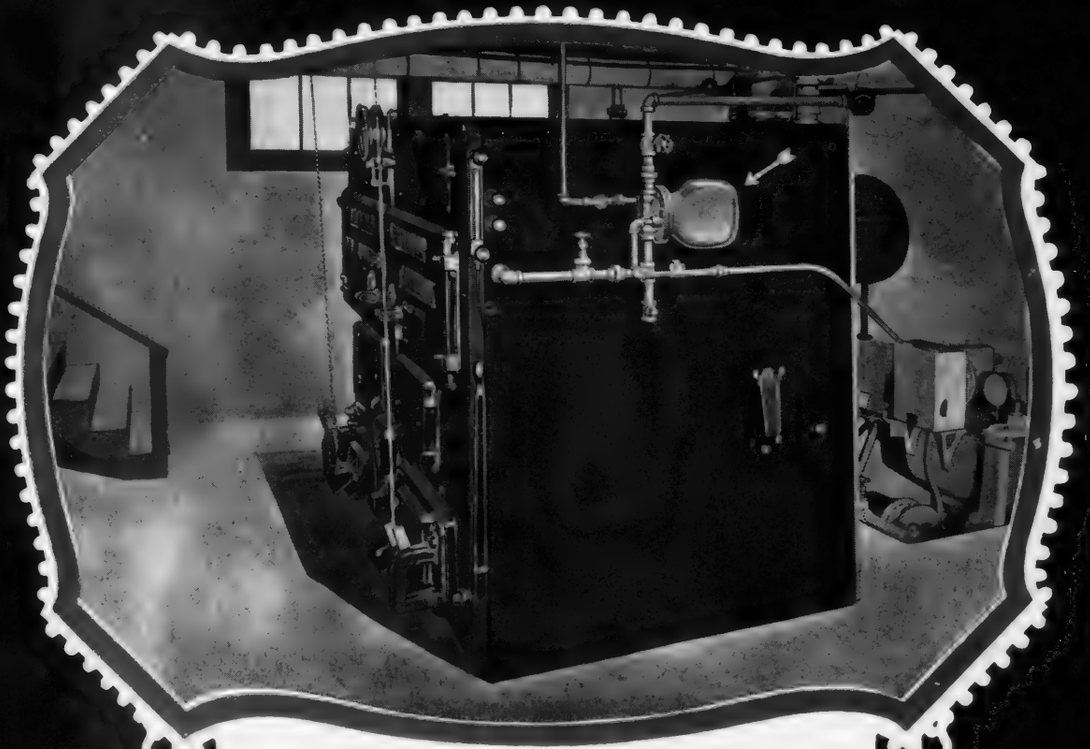
The large amount of pipe required for the various services in a modern apartment building and the vast amount of water, etc., used daily, add importance to the selection of the right material. A review of the specifications for many of the finest apartment buildings in the country shows a strong preference for "NATIONAL" Pipe in this type of service. Our Bulletin No. 19, on the subject of Pipe for Plumbing and Heating, contains information of interest and also of practical help to plumbing and heating contractors.
A copy will be sent upon request.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

GENERAL SALES OFFICES: FRICK BUILDING

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul
Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle
Export Representatives: U. S. Steel Products Co. New York City



In Mild Weather

Spring—when everyone is glad to forget about the winter's heating troubles—is an easy time to forget that, even though the heating plant is used only occasionally, it must *always* have water.

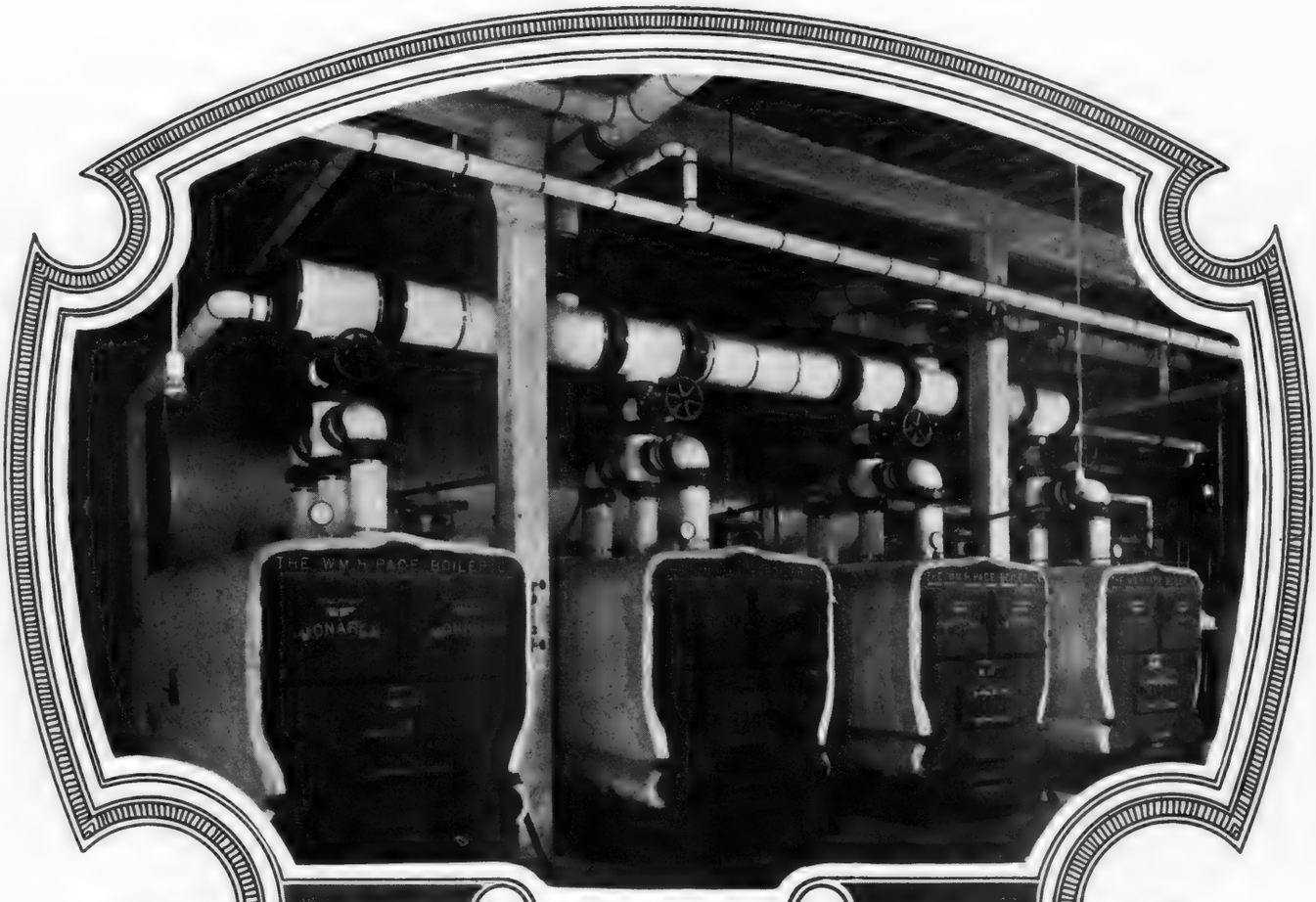
It takes only a few minutes of *low water* to ruin a boiler, even in mild weather. McDonnell & Miller Duplex Water Feeders are the watch dog of the boiler water line. In the dead of winter, when the heating plant is going twenty-four hours a day, it keeps the water line *always* where it belongs. In the spring, when the heating plant is more easily forgotten, it eliminates the "forgets" from boiler water line control.

The McDonnell & Miller Duplex Water Feeder supplies make-up water as needed and in addition, prevents the flooding of the boiler when excess condensate is returned from the system. It is a unit that eliminates all *chance* from boiler line control. It is on the job all the time. It is your protection against the expense and trouble that come from boiler water line neglect.

McDONNELL & MILLER
"DOING ONE THING WELL"

General Offices
WRIGLEY BUILDING
CHICAGO

Eastern Warehouse Stock
BUSH TERMINAL
NEW YORK



Typical installation of 40 Series Monarch Smokeless Boilers

Monarch Smokeless Boilers

in such installations as this, burning soft coal or other low grade fuel, are producing heating satisfaction under widely varying conditions and are saving money for owners—auxiliary air, discharged over the fire at the rear of the firebox, assuring the consumption of the carbon particles ordinarily sent up the chimney as black smoke. Grates, 22″, 28″, 40″ and 60″ wide —Page Safe Ratings, 850 sq. ft. to 21,600 sq. ft. Steam.

THE WM. H. PAGE BOILER CO.

Eestablished 1856 Incorporated 1877

Makers of Boilers for over half a Century

GENERAL OFFICES: 58 West 40th Street, NEW YORK

BRANCHES

BOSTON
123 Beverly St.

Philadelphia
1718 Sansom St.

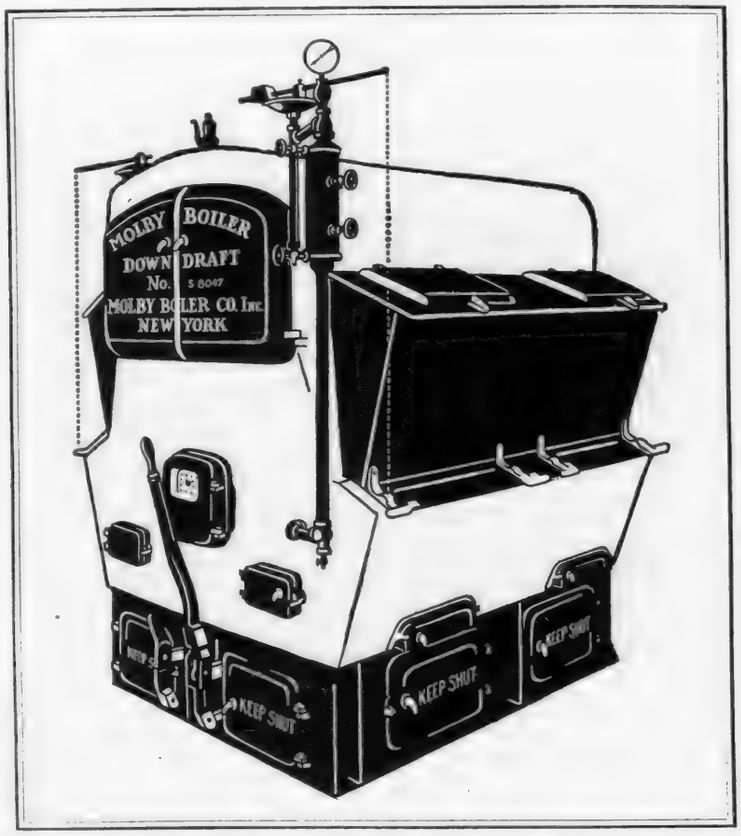
PAGE BOILERS

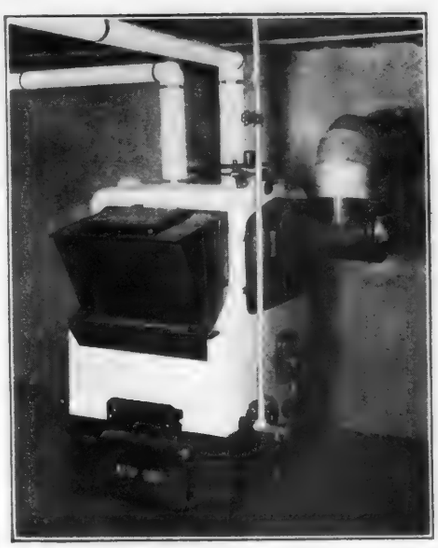
"The Distinguished Service Line"

BRANCHES

CLEVELAND
Rose Building

FACTORY
MEADVILLE, PA.





It burns No. 1 Buckwheat self-coaling—

The Molby burns low-priced No. 1 Buckwheat Anthracite without mixing with expensive larger coal.

You fill the magazine only every 12 or 14 hours. No blower. No electric current. No machinery to get out of order. For homes and large buildings. Low pressure steam, vapor or hot water heating; and for hot water supply.

The New MOLBY

HOUSE-HEATING BOILER

Back of the name "Molby" is the Molby Boiler Company, a pioneer in the design and development of magazine-feed downdraft-crossdraft boilers and tank heaters for burning the smaller sizes of anthracite.

A subsidiary of The Universal Pipe and Radiator Company, the Molby Company is backed by the resources of a complete group of industries which owns and operates foundries, mines, blast furnaces and its own iron fields.

burns No.1 Buckwheat

Steam and vapor sizes from 500 to 7750 sq. ft. Hot water sizes from 850 to 12925 sq. ft.

Ask for catalogue.

MOLBY BOILER COMPANY, New York: 41 East 42nd Street. Plant: Lansdale, Pa.

The handsome and spacious new Field House at Yale University is equipped with National Storage Heaters which are called upon to give an abundance of hot water in any emergency.

On the run for the Steaming Showers

NOW comes the peak load for the hot water system with sixty or seventy tired, perspiring huskies splashing under gallons of delightful hot water. Here we have a sudden demand for hot water that National Storage Heaters can handle perfectly. Every National installation is engineered individually. Every National Heater is designed to do more than the specifications call for. To install a National is a guarantee of the highest degree of efficiency day in and day out with the most economical cost of operation.

National Heaters are giving excellent service in Schools, Hotels, Clubs, Apartment Houses, Colleges, Gymnasiums, Y.M.C.A's, Office and Municipal Buildings

The National Heater is the Standard of the trade. There is no other heater that compares with it for quality.

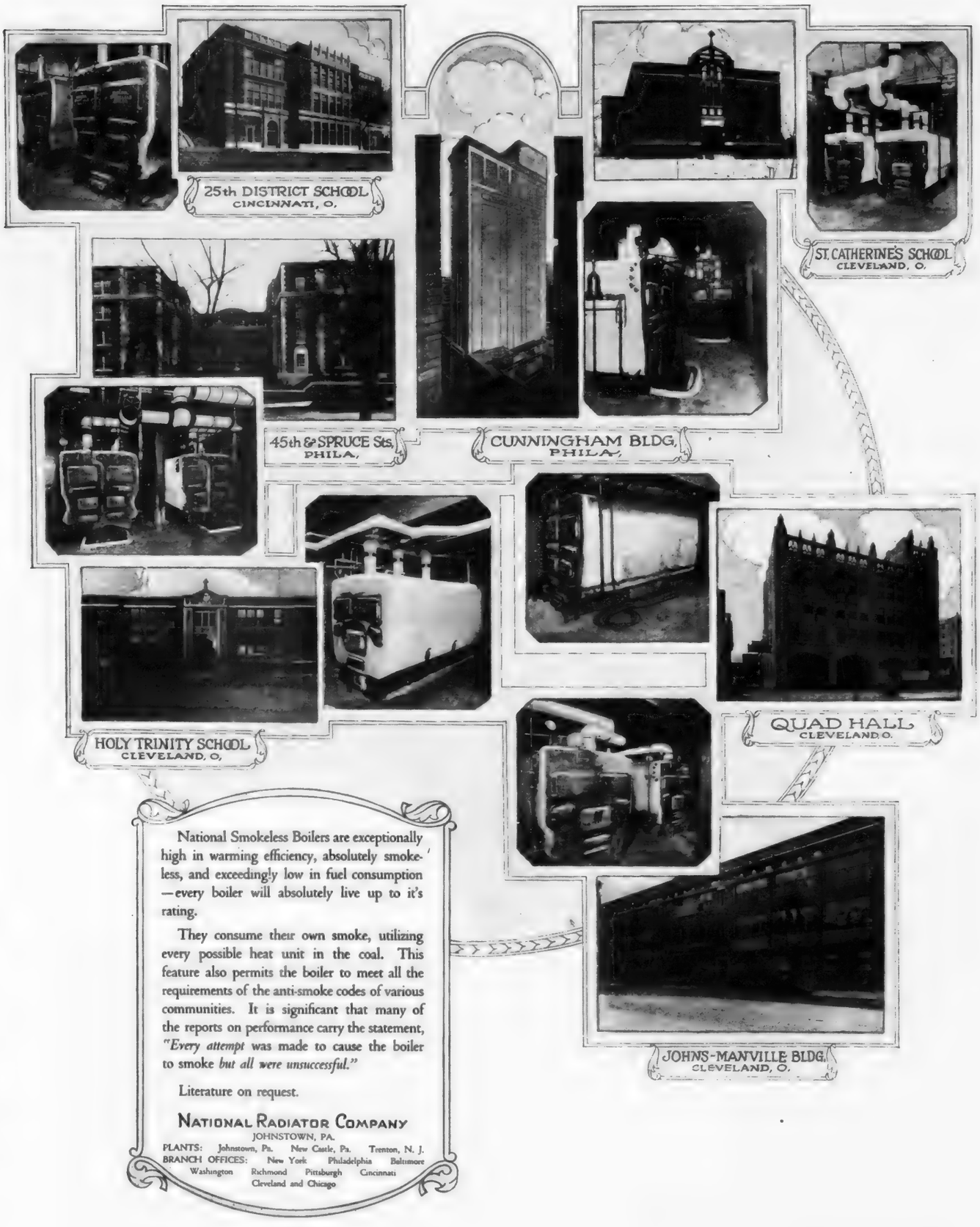
NATIONAL U BEND TYPE STORAGE HEATERS

The perfection of every mechanical detail and the fact that only the best and most suitable materials are used in their construction gives National Heaters a remarkably long life—double that of many others on the market.

National Heaters are the product of the oldest and most progressive organization in the field, an organization backed by 43 years of engineering experience. We welcome your inquiries. We'll be glad to assist you or to send our engineers to talk to you.

NATIONAL PIPE BENDING CO.
Established 1883
120 River St., New Haven, Conn.
Boston New York Philadelphia

Specify National Heaters For Your Next Building



National Smokeless Boilers are exceptionally high in warming efficiency, absolutely smokeless, and exceedingly low in fuel consumption—every boiler will absolutely live up to it's rating.

They consume their own smoke, utilizing every possible heat unit in the coal. This feature also permits the boiler to meet all the requirements of the anti-smoke codes of various communities. It is significant that many of the reports on performance carry the statement, *"Every attempt* was made to cause the boiler to smoke *but all were unsuccessful."*

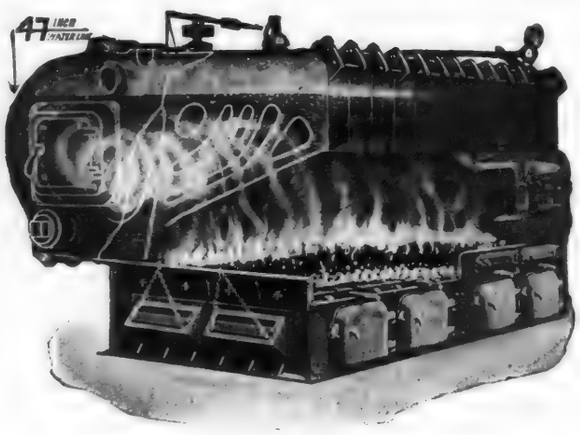
Literature on request.

NATIONAL RADIATOR COMPANY
JOHNSTOWN, PA.
PLANTS: Johnstown, Pa. New Castle, Pa. Trenton, N. J.
BRANCH OFFICES: New York Philadelphia Baltimore Washington Richmond Pittsburgh Cincinnati Cleveland and Chicago

NATIONAL SMOKELESS BOILERS
CONFORM WITH SMOKE CODES EVERYWHERE

Continental
BOILERS & RADIATORS

Mr. G. E. Parmenter of Indian Neck, Conn., says—
"For Better Residence Heating—Continental Low Water Line Boilers"



30 Series Boilers—43" Water Line
1,200 to 8,200 sq. ft. steam capacity
40 Series Boilers—47" Water Line
2,500 to 22,300 sq. ft. steam capacity

Mr. Parmenter is one of the thousands of property owners who have expressed the same thought by buying Continental Boilers for their homes.

There is a size and type for large residences, apartments, schools, churches, hotels, and industrial buildings.

With 43" and 47" water lines they are built to fit both ordinary and extraordinary conditions.

They burn any kind of fuel including oil.

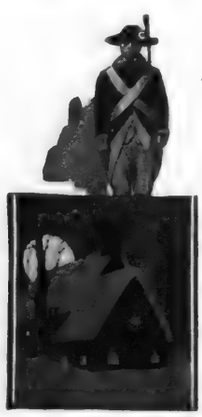
Side feed makes them easy for anyone to fire.

Water tubes in direct contact with the flames make them quick steamers.

Long forward and back fire travel assures maximum heat absorption before reaching chimney.

They are made in regular and smokeless types for either anthracite or bituminous coal.

If you want to cash in on the good business in your territory, send for the inside story of Continental Boilers and Radiators.



Continental Heater Corporation
Home Office and Factory
Dunkirk, N. Y., U.S.A.

Built for better heating

"Is smokeless and easy to operate . . ."

The **CombustiKator** eliminates all drudgery in the burning of coal. It meets all smoke ordinances. It is acclaimed the final solution of the coal burning problem by all who see it. It is revolutionary.

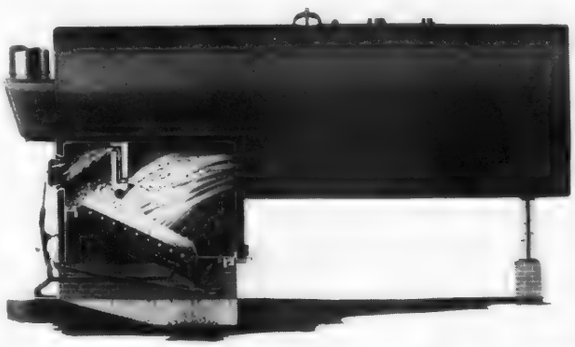
CHICAGO'S LARGEST, MOST BEAUTIFUL AND MODERN CO-OPERATIVE APARTMENT. Two No. 423 Kewanee Boilers are equipped with the **CombustiKator.** The accompanying letter shows what the architects think of the CombustiKator.

Only three simple operations are required to operate the CombustiKator. These are:

1. **Fireman throws coal against a wall;**
2. **Pull on stoker lever advances fuel along inclined stoker bars, leveling, cleaning and renewing fuel bed and keeping it free from ash and clinker;**
3. **Ash discharged into ash pit by releasing dump rod.**

The CombustiKator is fool-proof, firemen cannot make mistakes, no hand cleaning necessary, no skill required.

SIMPLE — EFFICIENT — FOOL-PROOF



CombustiKator installed in Kewanee Boiler showing simplicity of the CombustiKator, together with refractory hopper, coking chamber, etc.

Get the facts

Eliminates All Cleaning Periods

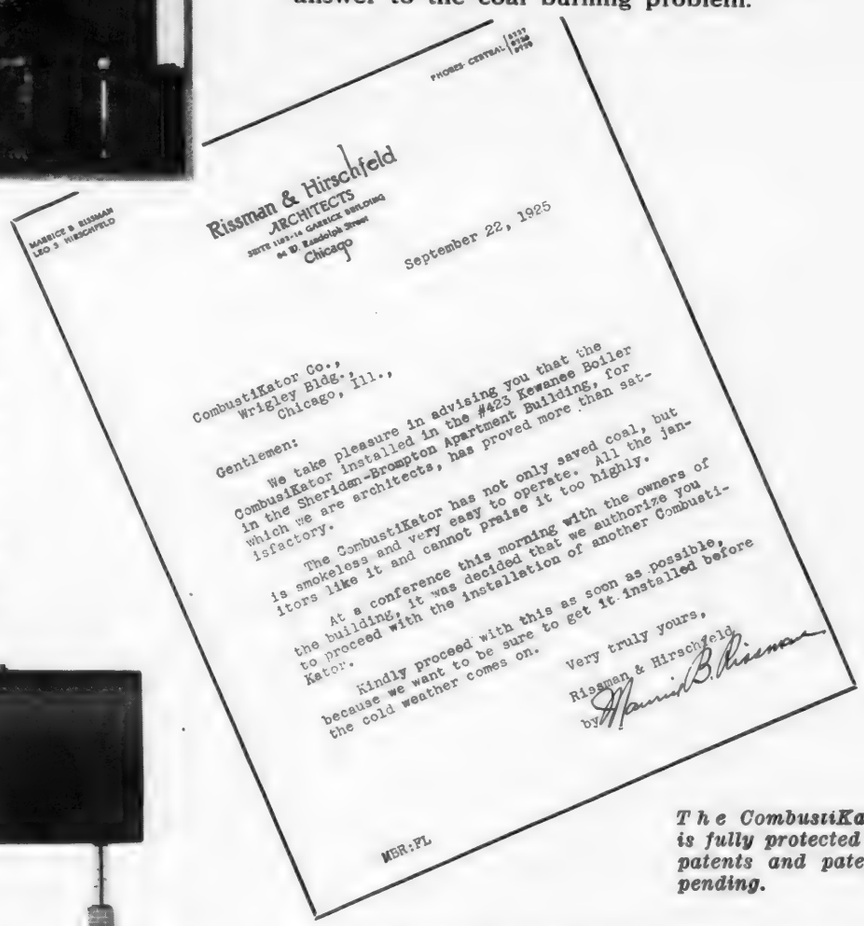
WHOLE HOPPER GRAVITY FEED **COKAL COMBUSTIKATOR**

CORRECT COAL BURNING ASSURED

Reg. U. S. Patent Office

A product of the CoKal Stoker Corporation

It is now as easy to fire the large boiler as it is to fire the little, old fashioned domestic magazine stove. The **CombustiKator** eliminates hand cleaning of fires. It cokes all coal and so prevents smoke. It prevents the fireman from poking and spoiling his fires and so interfering with combustion efficiency. It compels the proper combustion of coal. The **CombustiKator** is scientifically correct. It is so simple a child can operate it. It cannot be injured through abuse, carelessness or ignorance. It is the answer to the coal burning problem.



Rissman & Hirschfeld
ARCHITECTS
Chicago

September 22, 1925

CombustiKator Co.,
Wrigley Bldg.,
Chicago, Ill.,

Gentlemen:

We take pleasure in advising you that the CombustiKator installed in the #423 Kewanee Boiler in the Sheridan-Brompton Apartment Building, for which we are architects, has proved more than satisfactory.

The CombustiKator has not only saved coal, but is smokeless and very easy to operate. All the janitors like it and cannot praise it too highly.

At a conference this morning with the owners of the building, it was decided that we authorize you to proceed with the installation of another CombustiKator.

Kindly proceed with this as soon as possible, because we want to be sure to get it installed before the cold weather comes on.

Very truly yours,
Rissman & Hirschfeld
by

MBR:FL

The CombustiKator is fully protected by patents and patents pending.

All firebox boilers of the Kewanee type can be equipped with the **CombustiKator.** There is a huge opportunity for heating contractors to install the **CombustiKator** wherever smoke abatement is agitated, wherever low heating costs are desired and wherever it is necessary to develop highest efficiencies from existing equipment.

Architects, Consulting Engineers and Heating Contractors, send for full information about the **CombustiKator**—the perfect fireman. It is changing the entire coal burning situation and all it implies.

CombustiKator Company

Division of CoKal Stoker Corporation

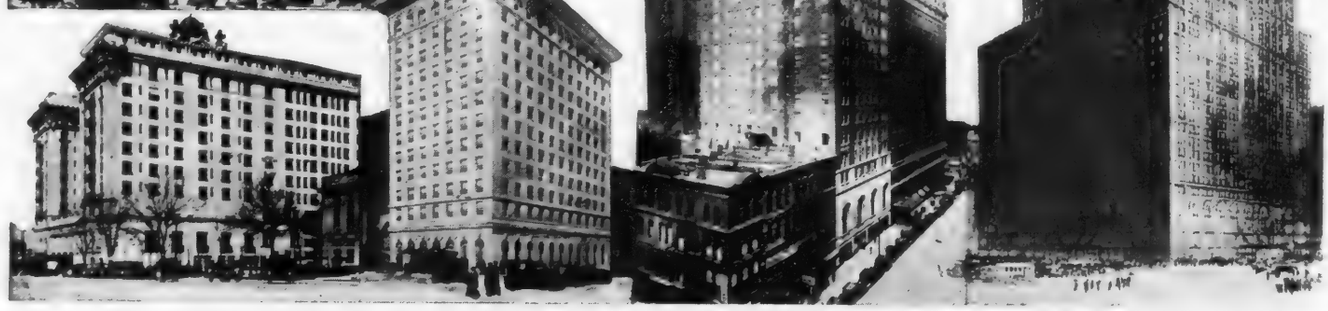
1014 Wrigley Building, Chicago

A National Skyline of Dunhamized Hotels

Top, left to right: Wolverine, Detroit. Redmont, Birmingham. Hamilton, Washington, D. C. Vendig, Philadelphia. Ambassador, N. Y. City.

Left, reading down: Neill, Columbus, O. Fort Des Moines, Des Moines. Nicollet, Minneapolis.

Lower, left to right: Utah, Salt Lake City. Clift, San Francisco. Sherman, Chicago. Morrison, Chicago.



From Coast to Coast and "'Way Down in Alabamy"

Travelers Enjoy Dunham Heating Comfort

WHEN a firm of architects adopts and specifies, over a varying period of years, the same certain equipment for a chain of buildings scattered throughout the country, but all emanating from their offices, it may well be a matter of satisfaction and pride to the manufacturer of that equipment.

However, the meaning of such architectural approval of the value and efficiency of any equipment is largely augmented if a large number of architectural firms in widely removed centers continuously select that product or equipment.

That is the testimony offered by this page of famous hostelries: Fourteen separately owned hotels in thirteen different states or provinces out of the office of fourteen different architects. Each of these fourteen architects in thirteen states specified Dunham in order to meet the insistent demand for patron-satisfaction, through heating comfort, as silent as it is even and constant.

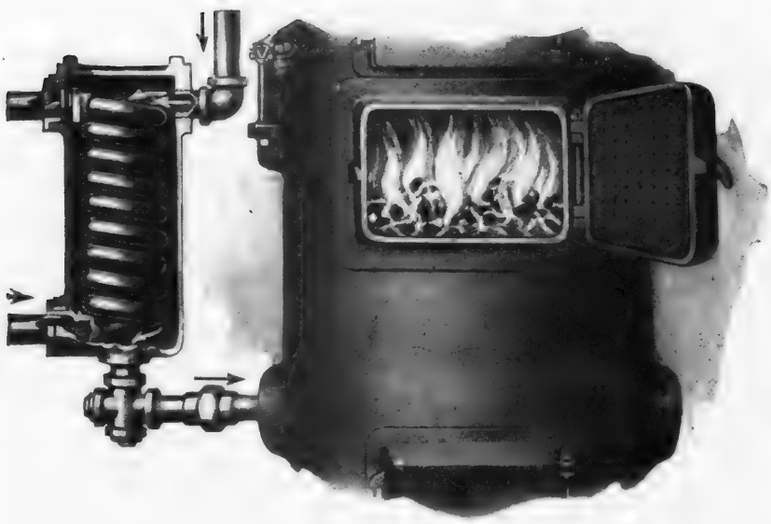
That's Dunham.

Over sixty branch and local sales offices in the United States and Canada bring Dunham Heating Service as close to your office as your telephone. Consult your telephone directory for the address of our office in your city

The DUNHAM HEATING SERVICE

C. A. DUNHAM CO.

230 East Ohio Street - - - Chicago



No Leaky Coils in Fire Pot

Fuel Burning Efficiently

when

The Quality *Indirect* Heater

uses

The Fire that Heats the Home
to Heat a Plentiful Supply of

HOT WATER

Made in all sizes to supply Hot Water for one family or one hundred families

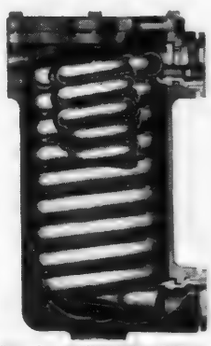
EXCELSO SPECIALTY WORKS, Inc.
59 Clyde Ave., Buffalo, N. Y.

210 E. 45th St.	32 Oliver St.	5939 Haverford Ave.
New York, N. Y.	Boston, Mass.	Philadelphia, Pa.

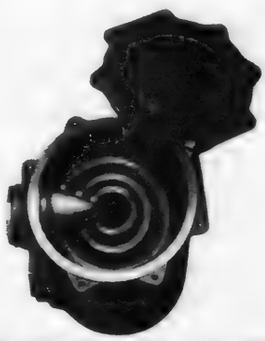
NATIONALLY DISTRIBUTED BY LEADING JOBBERS AND BOILER AND RADIATOR MANUFACTURERS

The Excelso PHAETON — for Warm Air and Hot Water Plants. Water Heating Capacities from 30 to 250 gallons. Water radiator heating from 40 to 400 square feet.

The Excelso INDIRECT — for Vapor and Steam Boilers, Single Coil Heaters from 30 to 120 gal. capacity.



The Excelso DOUBLE COIL—for larger Steam and Vapor Boilers. Capacity from 160 to 400 gallons.



Top View Triple Coil. Capacities 600 to 800 gallons.

EXCELSO WATER HEATERS

Sold by All Plumbers and Steamfitters

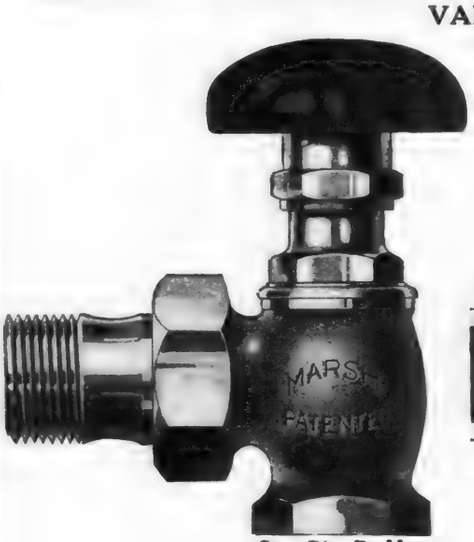
Randolph Hotel and Metropolitan Office Building
Wells, Randolph and LaSalle Streets, Chicago

Architects
C. W. & GEO. L. RAPP
Chicago

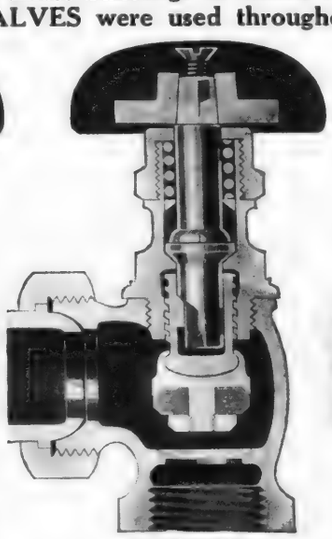
General Contractors
HEGEMAN-HARRIS CO.
Chicago

Heating Contractor
HANLEY & COMPANY
Chicago

SIMPLY ANOTHER of America's finest buildings in which MARSH CONE DISC RADIATOR VALVES were used throughout.



Cone Disc Packless
Fig. 141



Packless Feature

Cone Disc Modulated
Fig. 147

This Cone Disc construction combined with the **Marsh Re-enforced Packless Feature** is the last word in completing radiator valve **maximum efficiency** at **popular price,** all of which will check 100% true upon investigation.

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

Exclusive Sale Distributors

Appleton & Liptrott, Inc.
1480 Broadway, New York

Edward T. Hetherington,
1718 Sansom St., Philadelphia

United States Radiator Corp'n
General Offices: Detroit, Mich.

All territory east of west lines of Michigan and Ohio and north of Virginia, except New York and Philadelphia.

John W. Mabbs,
431 So. Dearborn St., Chicago, Ill.

Jas. P. Marsh & Company
118 So. Clinton St., Chicago, Ill.

All territory south of Ohio River and west of Michigan and Ohio, except Cook County, "Chicago, Illinois."

What an ABC dealer said—(Taken from a letter received Jan. 4th 1926.)

"After handling ABC for two years we are convinced it is years ahead of competition, and that the policies of the manufacturer are extremely liberal ~ ~ ~

We are having very little service, one man takes care of three-hundred burners."

Is there an ABC agency in your town?

The ABC franchise is valuable.

If there is no ABC agency in your town now, there probably will be soon. Good business men do not for long pass up opportunities for making money. And an ABC agency is a money maker.

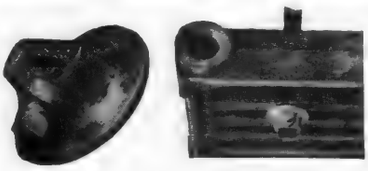
There is no better season of the year to take an ABC agency than now. Ask for details.

Listed as Standard by Underwriter's Laboratories.

AUTOMATIC BURNER CORPORATION
312 N. May Street, Chicago.

ABC OIL BURNER
no noise ~ no carbon

Adjustable Steel Insert



Ceiling Hanger

Adjustable Steel Hook Plates

Single Wall Radiator Bracket

Double Wall Radiator Bracket

HANGING RADIATORS WITH

FRANK

RADIATOR BRACKETS MEANS

Safety
Economy
Convenience

and

A Clean Concealed Job

Legless Radiator Bracket (shown below) is easiest to hang, greater adjustment, and requires

ONLY ONE BOLT.

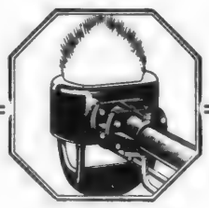
Save 12 cents and up on each bracket plus cost of drilling and inserting extra bolts.

Full line invented by John C. Frank, a steamfitter of long experience. Described fully in our pocket-size catalog. Send for one.

THE FRANK RADIATOR BRACKET CO.
30 No. LaSalle St.
Chicago

Legless Radiator Bracket

What they *look to you for*



THE man building, today—or planning to build—has simply got to have accurate information on oil-burning.

Gentlemen, it is not a question of oil-burning as against coal-burning. It is not a question of fuel, as such, at all.

It's a question of comfort—of health. Of *results.*

You can accept the reliability of modern oil-burning as accomplished by Nokol. It was proved eight years ago—before other manufacturers followed us into the field. It is being proved today in more than 27,000 American homes (more than one-third of all homes automatically oil-heated).

* * *

People want your impartial, trained judgment on the results Nokol heat will bring: in health, comfort, cleanliness. We offer a file of data on the subject—complete, also, on the mechanical details.

You will find it interesting and, we believe, profitable to have.

Address: **THE AMERICAN NOKOL COMPANY**
215 N. Michigan Ave., Chicago, Ill.

NO COAL
NOKOL
Automatic Oil Heating for Homes

Tested and Listed as Standard by the Underwriters' Laboratories and approved by all principal Safety Boards. *Manufactured and Guaranteed by* AMERICAN NOKOL COMPANY, *Chicago.*

RAYFIELD

PATENTS PENDING

Automatic Fuel Oil Burners

possess the practical features demanded by Heating Engineers

IN heating boilers and furnaces designed to burn coal the application of the maximum heat is at the bottom of the fire box. There is also a bed of coals to radiate heat during the periods of low fire. These are sound, well established engineering principles, and it is obvious that an oil burner must meet these conditions in order to produce the best results. Both of these principles are incorporated in the Rayfield Automatic Fuel Oil Burner and it is the only domestic oil burner that fully utilizes the Radiant Heat principle.

Rayfield's Scientific Combustion

Note the illustration. The nozzle is suspended over the fire pot. The vapor, burning in suspension, is forced directly downward to the crushed fire brick at the bottom, then deflected to the sides and rises evenly along the walls of the fire box before the generated heat escapes through the flue. In this manner the flame travels twice the usual distance in the fire box, giving off the maximum heat at the bottom of the fire box and completing combustion before reaching the flue.

The Radiant Heat principle is utilized through the bed of crushed fire brick placed in the ash pit. In operation this brick quickly becomes incandescent, absorbing and saving the heat that would otherwise be lost up the chimney. Long after the burner has been shut off by the thermostat, this white-hot bed of crushed brick continues to radiate its stored heat and thus assists in maintaining an even temperature throughout the building.

For Steam, Vapor Hot Water, Hot Air

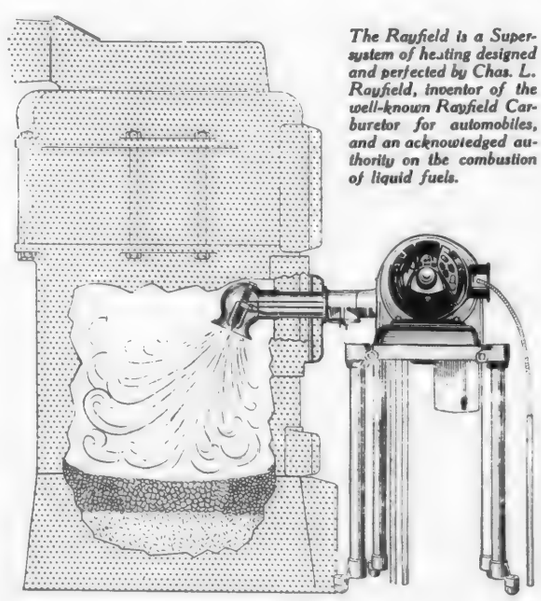
The Rayfield is fully automatic and operates successfully in any good heating plant. It comes in various sizes and has had three years of practical tests in homes, apartments, theatres and factories.

You have been waiting a long time for this scientific oil burner —a burner that you would readily install in your own home after seeing a demonstration.

Our Facilities and Organization

Our large plant is equipped with foundry, modern machinery, testing and assembly departments—everything necessary for economical and quantity production.

The same organization that produced the well-known Rayfield Carburetor is behind the Rayfield Oil Burner. Our reputation and responsibility are too well known to require further comment.



The Rayfield is a Supersystem of heating designed and perfected by Chas. L. Rayfield, inventor of the well-known Rayfield Carburetor for automobiles, and an acknowledged authority on the combustion of liquid fuels.

Rayfield Burns 28°-30° Fuel Oil

This grade of Fuel Oil is lower in cost and higher in heat units than the lighter oils. We burn it as clean as illuminating gas—no smoke, no carbon, no residue and no odor. The Rayfield can burn the lighter oils but they are not so economical.

4 Exclusive Features

that make the Rayfield Supreme

1. Utilizes the Radiant Heat Principle.
2. Perfected Electric Ignition.
3. Air-cooled, Non-carbonizing, Nozzle.
4. Triple Atomization.

Send for illustrated circular.

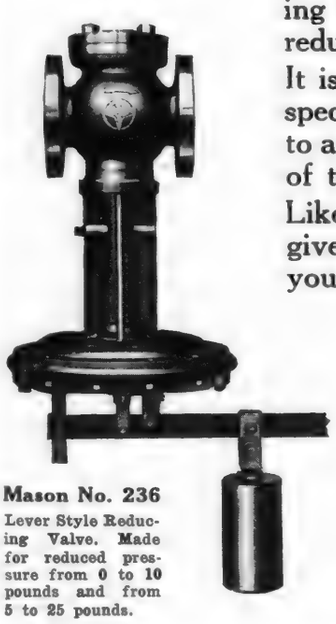
Rayfield Mfg. Co.

21st and Rockwell Sts., CHICAGO

Contractor-Dealers Wanted

The Rayfield franchise will appeal to men who know the heating business. A profitable connection is offered responsible parties who are prepared to demonstrate, sell and install our equipment. Write for territory and further particulars.

Mason Announces a New Reducing Valve
For Accurate Regulation of Steam in Heating Systems



Mason No. 236
Lever Style Reducing Valve. Made for reduced pressure from 0 to 10 pounds and from 5 to 25 pounds.

Simple, positive and dependable, the new Mason Lever Style Reducing Valve is proving as popular as the famous Mason high pressure reducing valves so widely used industrially.

It is balanced and operates with a minimum amount of power irrespective of the initial pressure. Friction of moving parts is reduced to a minimum by the elimination of stuffing boxes and the suspension of the weighted lever on hardened steel knife edges.

Like all Mason Regulators the Mason Lever Style Reducing Valve gives you the certainty of years of accurate performance. It will pay you to specify Mason.

Let us send you Catalogue and Handbook No. 62 containing valuable information.

Mason Regulators
MASON REGULATOR CO.
Boston, Mass.

8948

No Waiting for Hot Water
with Dahlquist Aquatherm Copper Range Boiler

INSTEAD of having to wait for a whole tank of water to become heated, you may have instant hot water at a minimum cost by installing a **Dahlquist Aquatherm Copper Range Boiler.**

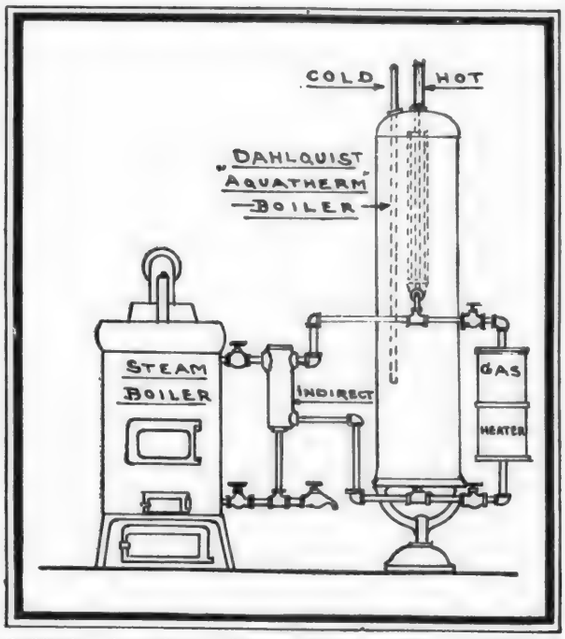
It is connected the same as an ordinary range boiler and can be furnished in any size desired.

The **Dahlquist Aquatherm** can be furnished separately in proper size for any range boiler now installed.

When hot water is not drawn, the **Aquatherm** stores it in the range boiler. The action of the **Aquatherm** is entirely automatic.

Let us send full details

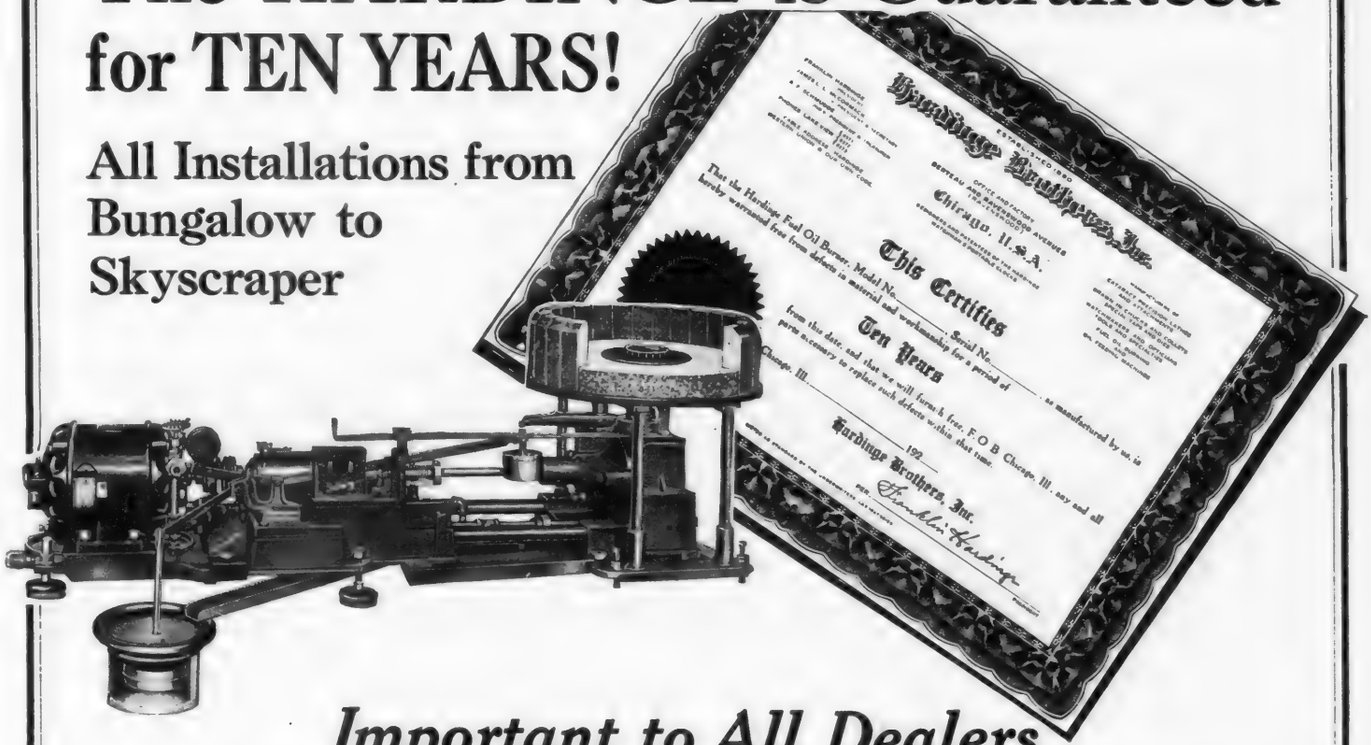
DAHLQUIST MFG. CO.
40 W. 3rd St. BOSTON, MASS.



Dahlquist Aquatherm Copper Range Boiler installed in cellar in connection with gas tank water heater and indirect water heater in cellar

The HARDINGE is Guaranteed for TEN YEARS!

All Installations from Bungalow to Skyscraper



Important to All Dealers

THE HARDINGE Fuel Oil Burner has been in service for eight years; its performance has been so highly successful that we now guarantee every Hardinge leaving our factory for a period of ten years.

The Guarantee Reads:

"This certifies that the Hardinge Fuel Oil Burner, Model No.——— Serial No.———, as manufactured by us is hereby warranted free from defects in material and workmanship for a period of ten years from this date, and that we will furnish free, F. O. B. Chicago, Ill., any and all parts necessary to replace such defects within that time."

The Company Back of this Guarantee

Hardinge Brothers, Inc., have been internationally recognized manufacturers of foremost rank for more than a third of a century. The famous Cataract Line of Precision Tools is numbered among our products, and we are also designers and patentees of the Hardinge Watchman's Portable Clocks.

Approved by the Underwriters Laboratories

The Hardinge Fuel Oil Burner is listed as standard by the Underwriters Laboratories, and this listing covers both the industrial and domestic burners.

Year 'Round Business for our Dealers

The Hardinge heats all buildings—from bungalow to skyscraper. Thus our dealers are not dependent upon one season only; they have a year 'round business.

The HARDINGE Requires Little Service

Because of this, our dealers are placed in an enviable position. Their sales are permanent; they have no unusual items of "service" to eat into their just profits; and their customers are friends and boosters.

Of Importance to Dealers

WE invite correspondence from responsible dealers in the heating industry. The ten-year guarantee covering each Hardinge burner is your definite assurance that this machine will give faithful performance to your customer and the utmost satisfaction to you.

HARDINGE BROTHERS, Inc.

4151 Ravenswood Avenue **CHICAGO, ILL.**

Combination heating in homes

Gasteam Radiator in Dining Room of a New York Apartment

for living room and dining room

IN combination heating systems steam heat is available as wanted, for living rooms and dining rooms at night, or in the spring and fall when the main heating plant is shut down.

The landlord need not run the heating plant when only a little heat is required in a few rooms for a few hours each day.

The occupants appreciate the fact that they are not being charged for a lot of heat that they neither need nor want—but still have steam heat in living room and dining room, when they want it.

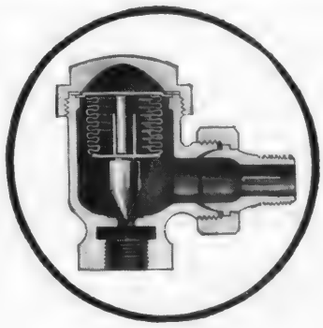
Combination heating permits of starting the boiler a month or two later in the fall and shutting it down a month or two earlier in the spring.

The cost of installation is negligible in comparison with the savings and convenience.

JAMES B. CLOW & SONS
201-299 N. Talman Ave., Chicago
Sales Offices in Principal Cities

[*Each Radiator an Independent Steam Heating Plant*]

CLOW
GASTEAM—GASWATER



Look at These Prominent Installations

Here are just a few of the buildings, scattered from coast to coast, in which Sarco Radiator Traps have been installed. We can refer to hundreds of others.

Allerton Hotel, New York
Majestic Hotel, New York
Times Square Hotel, New York
Hotel Royal Bermudiana, Hamilton, Bermuda
Bermuda Club, Bermuda
Hotel Nassau, Long Beach, L. I.
Ford Manor Apartment, Detroit, Mich.
Police Precinct Bldg., Detroit, Mich.
Jamestown Hotel, Jamestown, N. Y.
New York Pie Baking Co., Newark, N. Y.
Ford Assembly Plant, Arabi, La.
Rollman & Sons, Cincinnati, Ohio
Continental Can Co., Jersey City, N. J.
Robert Griffin Co., Jersey City, N. J.
Passaic Worsted Spinning Co., Passaic, N. J.
American Snuff Co., Clarkesville, Tenn.
Vacuum Oil Co., Paulsboro, N. J.
Knights of Columbus Bldg., Haverstraw, N. Y.
Tremont School, Cleveland, Ohio
Addison School, Cleveland, Ohio
University of Virginia Gym, Charlottesville, Va.
Farnum School, Royal Oak, Mich.
Central Village High School, Central Village, Conn.
Moses Taylor Hospital, Scranton, Pa.
Mercy Hospital, Cedar Rapids, Ia.
Strand Theatre, Schenectady, N. Y.
Watson Bldg., San Francisco, Cal.

If you want to be sure, beyond any question of doubt, of specifying radiator traps on which there will be no comeback, no kicks, you can't go wrong on the Sarco.

Our booklet P-126 explains why. Write for a copy.

SARCO COMPANY, Inc.
231 Broadway, New York City

Buffalo **Chicago** **Philadelphia**
Boston **Detroit** **Cleveland**
Peacock Bros., Ltd., Montreal

SARCO
Radiator Traps

HOME IS WHERE THE HART IS

Taking the Guess Work out of Furnace Work

Widespread, popular demand for the Hart Oil Burner is due to consistent results in use—convenience and reliability beyond any previous experience.

To men who know heating, the reasons for such results are unmistakably clear. Such men see, in the Hart, an engineered product, built by precision methods and matured by years of painstaking development.

A sturdy, compact, self-contained unit clean in performance and clean in design. Mark its ability to burn both lower and higher grades of domestic fuel, and with equal efficiency.

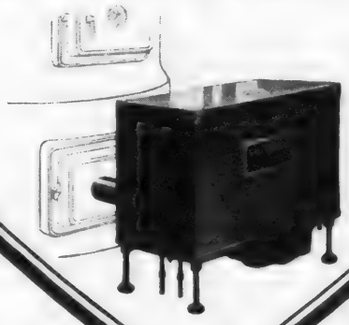
Surplus capacity, coupled with 100 per cent automatic action, means even heat day in and day out, with no attention from the owner.

Of course such a burner is endorsed as standard by the Underwriters' Laboratories, Inc. Can be attached to any type of furnace in five hours.

Because the Hart is the type of burner you would be proud to represent, and is built by an old, established company, it may hold for you an attractive sales opportunity.

May we send you our latest booklet on Oil Heating for Homes?

W. B. WILDE CO., *Peoria*, Illinois



Some desirable openings still exist for dealers of character and ability. We invite correspondence.

HART ELECTRIC ICER
A complete highly developed iceless refrigerator for the home. Send for booklet.

HART OIL BURNER

W. B. WILDE CO.
2133 North Adams Street,
Peoria, Illinois
You may send me, without cost or obligation, your latest booklet on Oil Heating.

Name .....
Street .....
City ..... State .....

THE

W.D. CASHIN CO.
THERMOFLEX

No. 3 RADIATOR TRAP

One of our Complete Line of Specialties for Vapor and Vacuum Heating Systems

Diaphragm is our one-piece Thermoflex Bellows and embodies all the latest features in design and construction to make a thermostatic radiator trap long lasting and efficient.

Complete Bulletin Catalog mailed if requested

MANUFACTURED BY

W. D. CASHIN COMPANY

35 HARTFORD STREET BOSTON, MASS.

Here are SEVEN *Outstanding Constructional Features of the* SCOTT SWING CHECK VALVE

Scott Swing Check Valve

1. Made of best grade bronze.
2. Extra heavy body.
3. Substantial hex on cap gives a good grip for wrench in case valve is to be taken apart.
4. Hexes are MILLED to standard sizes, making them readily interchangeable.
5. Disc revolves and is self adjustable. It closes at an angle of 45° which makes its action positive and opening is easier under slight pressure.
6. When regrinding plug, which is easily accessible, is removed, there is plenty of room to insert tool to revolve the disc on the seat.
7. The bridge wall is very heavy and lends strength to entire body of valve.

Scott Valve Manufacturing Company

3962 McKinley Avenue **Detroit, Michigan**

SCOTT SINCE 1886 VALVES

SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"

Reach 3 Big Markets

with this one franchise

Domestic Oil Burner—Industrial Oil Burner—Independent Water System

(direct from well)

HERE is the combination that solves the greatest problem of the oil burner dealer—how to eliminate the tremendous loss through the quiet months, when overhead goes on but sales fall way off.

The double franchise for the nozzle type Combustion Fuel Oil Burner, adaptable to both domestic and industrial uses and the Milwaukee Air Power Water System, produced by the same organization, will do this for you. Both are outstanding developments, big leaders, big sellers, time tried. And, the quiet months on one are the busy months on the other. This double franchise means "goodbye" to dull seasons. It brings an ideal sales balance to your business.

Read the outstanding features of the Combustion Fuel Oil Burner given here.

1. The only truly automatic system burning genuine fuel oil that is suitable for domestic or industrial use. Nozzle-type—the same principle used in steel mills and by U. S. Navy for many years. Insures perfect atomization and combustion.
2. Manufactured since 1919. Thousands in use in all parts of the country. The most dependable, safest oil burner.
3. Quiet in operation.
4. No smoke, dirt or odor. No labor required.
5. 85 less parts than any other completely automatic oil burner; only one moving part, motor driven air pump.
6. Automatically self-lubricating.
7. No complicated clock mechanism, gears, cams, levers, rods or drip cans.
8. No alteration to boiler or furnace required.
9. Flooding with oil is impossible. Perfect control of fuel; flows only when needed.
10. Oil flow is governed by air pressure or oil pump; stops when motor stops.
11. Very low pressure is required. Perfect control, high pressure impossible.
12. Tank, motor and pump can be installed in any convenient part of basement. Gas or electric ignition, economizer provided on all gas-fired units.
13. All pipes are small and may be installed under the concrete floor.
14. Maximum heating efficiency obtained.
15. Listed as Standard. Has ful Underwriters' approval.

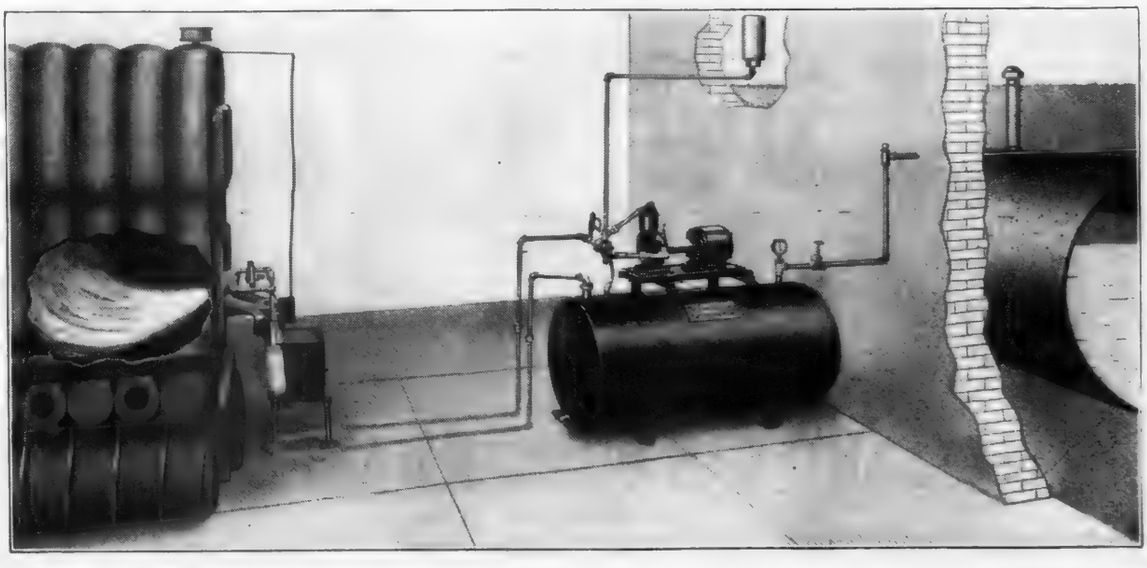
Write for complete information about this better oil burner and the advanced Milwaukee Air Power Water System that gives complete water service, direct from a number of sources

COMBUSTION FUEL OIL BURNER CO.

Subsidiary of Milwaukee Air Power Pump Co.

13 Keefe Ave. Milwaukee, Wis.

The Combustion Fuel Oil Burner



No Heater Is Better than its Burner—That's Why Hoffman Uses

BARBER Patented JET GAS BURNERS

Hoffman Automatic Hot Water Storage Heaters are nationally known to be highly efficient and economical. In them the highest quality of materials and workmanship are used. They are heaters that sell and stay sold.

And because they know that no heater is better than its burner—that without an efficient burner no Hot Water Heater stands the test, the manufacturers of Hoffman heaters have adopted Barber Patented Jet Gas Burners.

Barber Patented Jet Gas Burners are ideal for practically every make of water heater. Comparative tests by us on 80% of the best makes of such heaters show that in every instance they have improved efficiency.

This is due to the fact that they—

1. Reduce gas bills 25 to 40%.
2. Act as their own pilot light.
3. Can be controlled with any good thermostat.
4. Develop 1960 degrees Fahr. with 500 B. t. u. gas.
5. Cannot be affected by corrosion or condensation.
6. Will not back-fire, or deposit carbon—on any pressure.
7. Require no adjustment, or service, regardless of pressures or quality of the gas.
8. Will produce a perfect orange green flame with artificial, natural or mixed gases.

Among the many Heater Manufacturers who have adopted and are using "Barber Patented Jet Gas Burners" are the following:

American Radiator Company
Barton-Roth Co.
Bastian-Morley Co. (Crane)
Bryan Steam Corporation
Coast Heater Mfg. Co.
Day & Night Water Heater Co.
Franklin Plumbing Supply Co.
Geneva Heater Co.
Gewert Mfg. Co.
Hoffman Heater Co.
Hotstream Heater Co.
Edw. Katzinger Co.
Lovekin Water Heater Co.
The New Way Mfg. Co., Inc.
Piatt Water Htr. Co.
Sands Manufacturing Co.
Snap-O-Stat Co.
Southard Robertson Co.
Superbo Water Heater Co.
Superbo Mfg. Co.
Welsbach Company
Walter Mork Heater Co.

Write for our new Jet Burner Catalog, illustrating our newer designs and giving full information—engineering data—prices and discounts.

Barber Burner used in Hoffman No. 20 Heaters

HOFFMAN *uses*

BARBER Patented JET GAS BURNERS

Barber Burner used in Hoffman No. 40 Heaters

The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

REAL FACTS

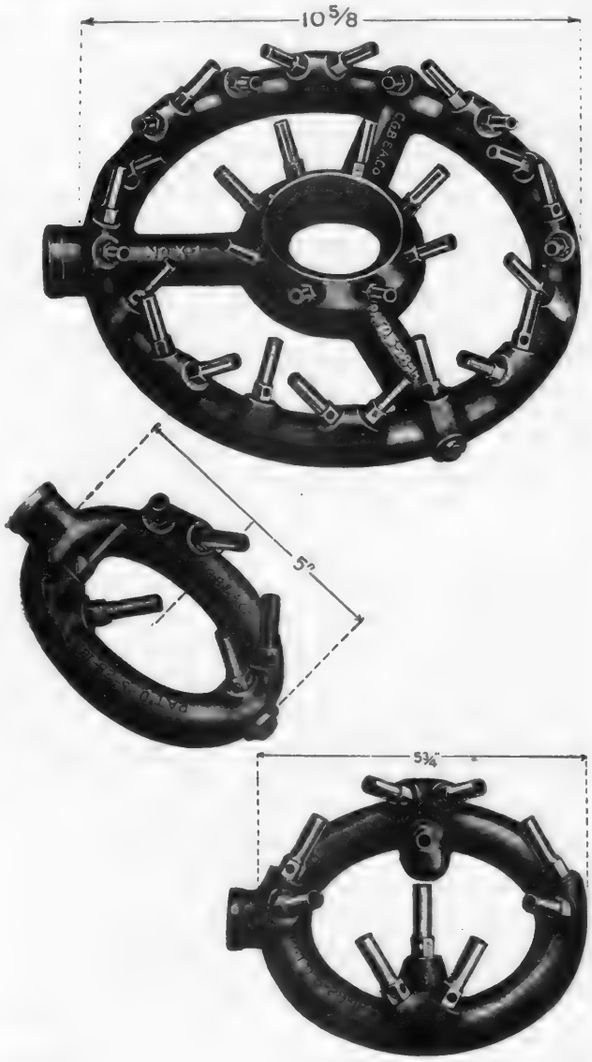
Over 250,000 Heaters will be sold during 1926 in which Barber Jet Burners are the standard heating elements.

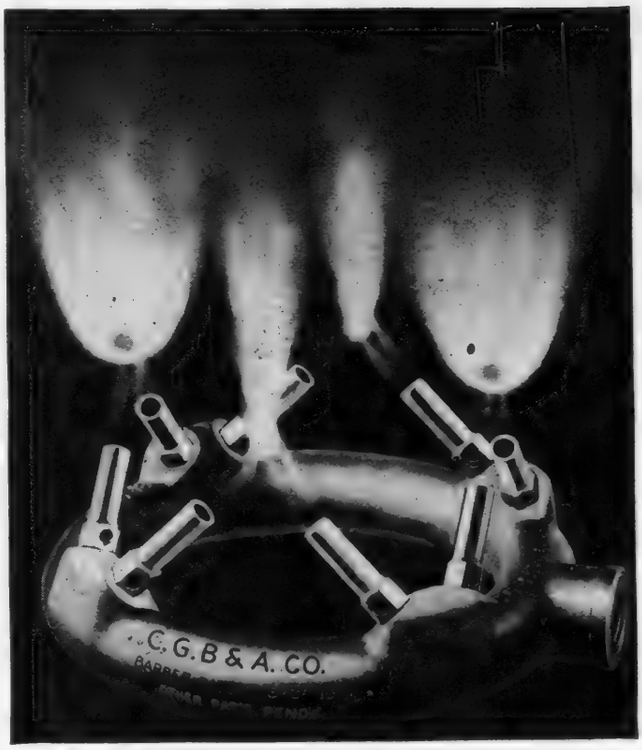
The Heating Engineer—Plumber and Fitter—Jobber and Gas Company—are recognizing the superiority of Heaters equipped with Barber Jet Burners. They are demanding heaters equipped with them.

We have made accurate comparative tests upon 80% of best makes of such heaters and in every instance have improved their efficiency—burned less gas—eliminated back-firing, carbon and fumes —with Barber Jet Burners.

Barber Jet Burners function perfectly in all gas districts throughout the United States and Canada.

We will prove conclusively to any open minded Heater Manufacturer—by means of accurate tests, in our well equipped laboratory—at no expense to him—that we can adapt a Barber Jet Burner to his heater which will improve its efficiency—with the use of less gas.





No heater is better than its burner and without an efficient burner no appliance stands the test—that's why the leading manufacturers of Hot Water Heaters, Gas Furnaces, Boilers and Heating Appliances are adopting

BARBER Patented JET GAS BURNERS

Because they—

1. **Reduce gas bills 25 to 40%.**
2. **Act as their own pilot light.**
3. **Can be controlled with any good thermostat.**
4. **Develop 1960 degrees Fahr. with 500 B.t.u. gas.**
5. **Cannot be affected by corrosion or condensation.**
6. **Will not back-fire, or deposit carbon—on any pressure.**
7. **Require no adjustment, or service, regardless of pressures or quality of the gas.**
8. **Will produce a perfect orange-green flame with artificial, natural, or mixed gases.**

Write for our new Jet Burner Catalog, illustrating our newer designs and giving full information—engineering data—prices and discounts.

SUPPORTING A&B MEMBER

The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3702-04 Superior Avenue, Cleveland, Ohio

MILWAUKEE TWENTY-FIFTH

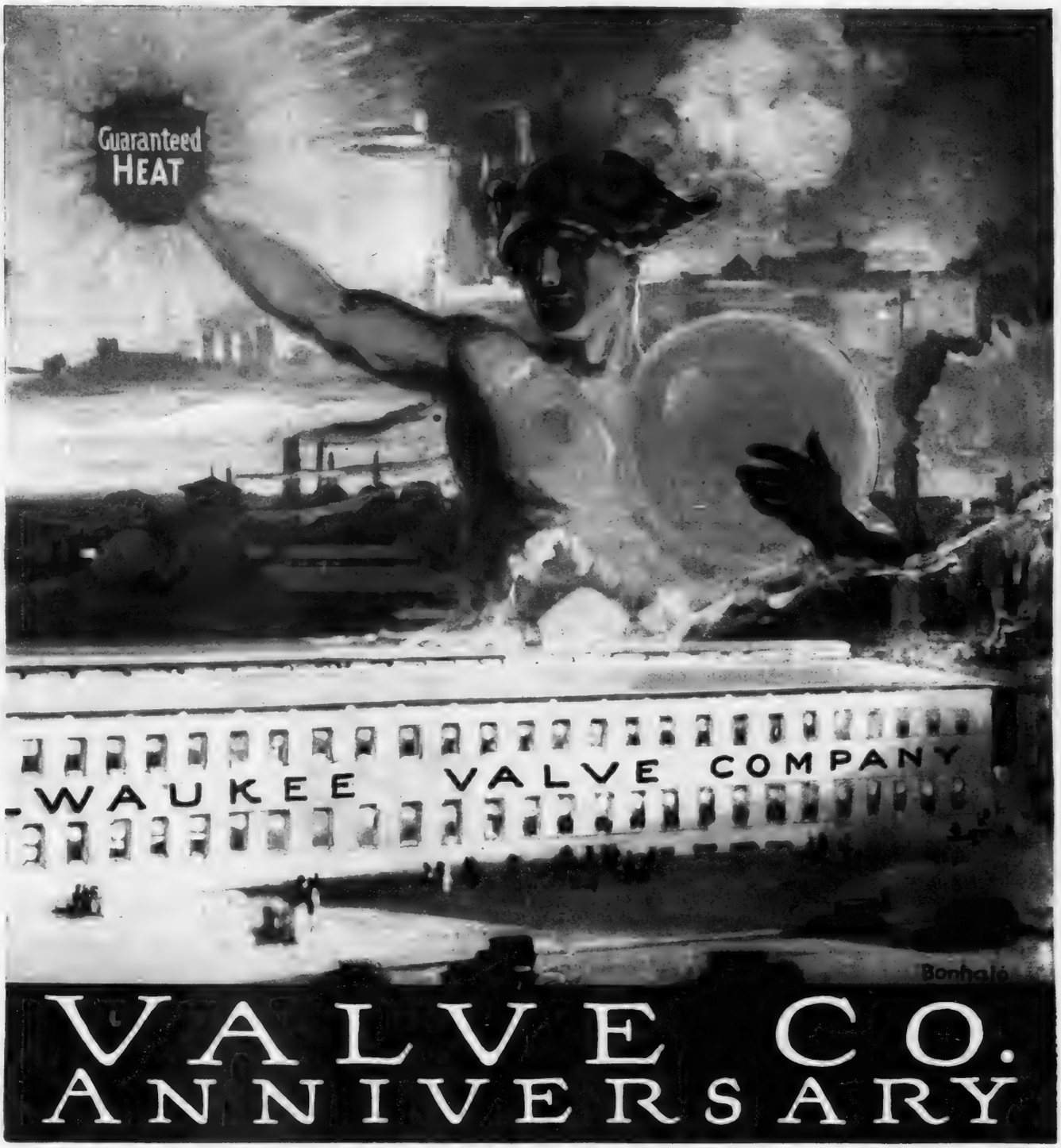
"Milvaco" Thermostatic Trap

Looking Back

OVER a quarter of a century ago under humble circumstances the Milwaukee Valve Company was founded. The manufacture of a number of heating specialties was pursued with but few men and limited floor space.

But from the early ideals came the inspiration which aided in the development and reputation of the Milwaukee Valve Company of today.

MILWAUKEE VALVE CO.,



VALVE CO. ANNIVERSARY

Looking Ahead

IN the steady growth of the past twenty-five years—of dependable quality and uninterrupted service is born the determination to serve, even better in the future than we have in the past.

Our three requisites for success—quality products, faithful service, close co-operation—on these your patronage is solicited.

"Dole-Milwaukee" Packless Radiator Valve

MILWAUKEE, WISCONSIN

COMMONWEALTH LAVIGNE
RADIATOR VALVES

Offer Tangible Quality

Each manufacturer claims his product is superior, but, in the majority of cases, this superiority must be accepted on faith.

In Commonwealth Lavigne Radiator Valves, however, the quality is tangible—something you can see, feel and test. The added strength at an important point gained through the use of a forged brass tail-nut is an advantage apparent to every steamfitter. Take hold of the new "Knobby Grip" handle and you at once realize that here is a handle worth while. Examine the mechanical operation and you are convinced that it is correct. Inspect the machining, note the careful finish—then place our valve side by side with any competitive make. You will agree that here is a valve far above the ordinary.

In addition to a complete line of standard radiator valves we also manufacture the Lavigne Packless Quick Opening Steam Radiator Valve.

Your Jobber Can Supply You

COMMONWEALTH BRASS CORPORATION
Detroit, Michigan

Good workmanship is not enough!

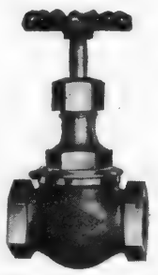


Fig. 106, screwed, Jenkins Standard Bronze Globe Valve

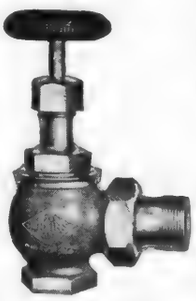


Fig. 168, Jenkins Bronze Radiator Angle Valve with male union

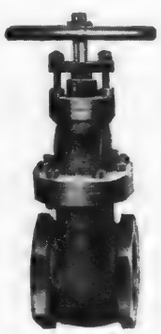


Fig. 325, screwed, Jenkins Standard Iron Body Gate Valve

A reputation for good heating service cannot be maintained by the most skillful workmen without the use of first class equipment.

It is a simple matter to make sure of the valves. The Jenkins "Diamond" on the body of a valve is all you need to see to know your men are installing a valve that does its job and does it well, that aids in keeping good work at its best.

"Jenkins throughout" means freedom from trouble due to pipe strains. There is reserve strength in every genuine Jenkins.

JENKINS BROS.
80 White St.....New York, N. Y.
524 Atlantic Ave.....Boston, Mass.
133 No. Seventh St.....Philadelphia, Pa.
646 Washington Blvd.....Chicago, Ill.

JENKINS BROS. LIMITED
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Central Terminal Bldg., New York City. Julius A. Tishman & Sons, Inc., Owners. Schwartz & Gross, Architects.

Pennsylvania Bldg., New York City. Julius A. Tishman & Sons, Inc., Owners. Schwartz & Gross, Architects.

REPEAT ORDERS

Repeat orders—regular customers—these spell the success of a product. It is our repeat orders from regular customers that we are proud of, for they mean that ILLINOIS HEATING SYSTEMS have fulfilled our claims for economical operation, durability and efficiency.

Our 25 years in the Heating field have brought us hundreds such customers who think only of Illinois when heating is to be considered. The owners of the buildings shown above have used Illinois Heating System for ten years on many other buildings.

Bulletin No. 21, containing Vapor System Details, together with standards for computing radiation and boiler sizes will be forwarded on request. Our engineering department is always at the service of the engineer for detailed information.

Consult telephone directory for address of local office

ILLINOIS

PRODUCTS

Radiator Traps
Modulating Valves
Return Traps
Pressure Reducing Valves
Heat Retainors
High and Low Pressure Steam Traps
Blast Traps
Separators *—oil and steam*
Back Pressure Valves
Expansion Joints

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President **INCORPORATED 1900**

CHICAGO

Why Engineers Specify
ADSCO EXPANSION JOINTS

Every ADSCO EXPANSION JOINT is built to fill a specific requirement. No costly experiments are necessary to select the proper joint for any set of conditions. ADSCO'S 48 years' experience is a dependable guide.

A distinctive sturdiness of construction and well balanced design carry to the engineer and purchaser an assurance of uninterrupted service.

Look over our Bulletin No. 182-H. It shows why you can select an ADSCO EXPANSION JOINT for any type of installation.

Send for bulletins describing these Adsco products.

The popular DUPLEX-SLEEVE Guided EXPANSION JOINT.

Packless and slip type Expansion Joints.

Conduit and Insulation for Low and High Pressure Underground Steam Lines.

Metering Devices for Steam and Condensation.

Steam Traps.

Regulators for low pressure steam.

Heating Specialties for Atmospheric Pressure and Vapor Heating Systems.

Ask for Bulletin No. H-12 giving information about our complete line of equipment for underground steam lines.

High quality is one reason why the ADSCO Joints shown here were used in the Erie County Hospital job at Wende, N. Y.

There is an ADSCO Expansion Joint for Every Class of Service

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

Offices:
New York Chicago Seattle

Photo by Fairchild Airial Camera Corp., N. Y.

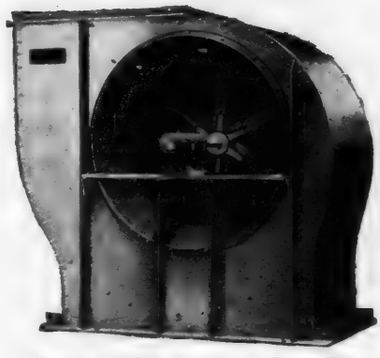
In Downtown New York

FOUR of the finest buildings have installed in them Massachusetts Fans. These buildings—designated by the white circles—are the Woolworth Building, Municipal Building, New York County Court House, and The Citizens National Bank Building.

Massachusetts Squirrel Cage Fans are backed by twenty-five years' experience.

From New York to San Francisco we could draw white circles on the skyline where prominent buildings have them installed, and where they have proven economical, efficient and dependable under all sorts of operating conditions.

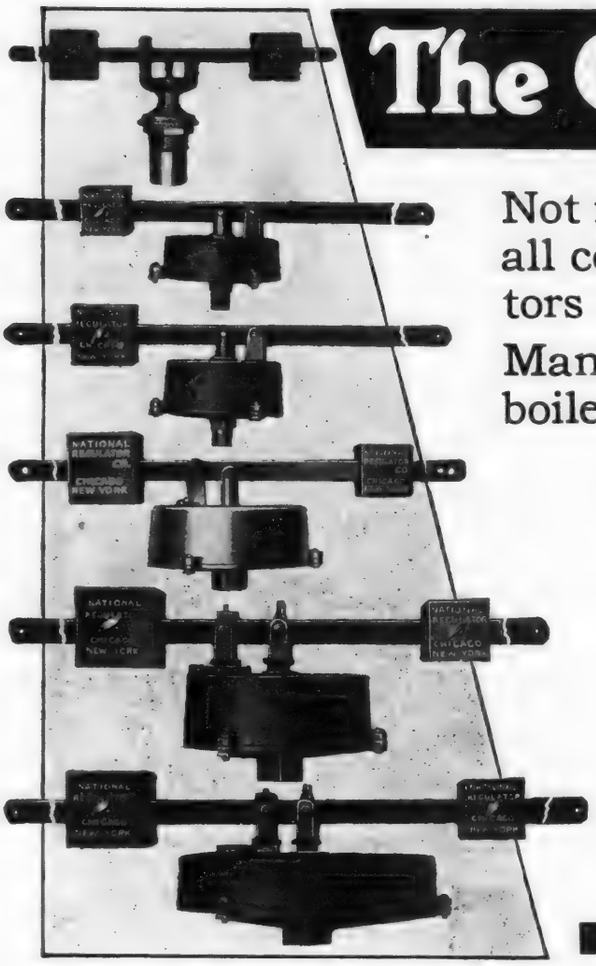
Let us mail you our complete technical data.



Single Width Squirrel Cage Fan

THE BISHOP & BABCOCK SALES CO.
MASSACHUSETTS BLOWER DIVISION

GENERAL OFFICES - CLEVELAND, OHIO



The Complete Line

Not merely one regulator to cover all conditions but a line of regulators to meet every requirement. Manufacturers of the better boilers have standardized on

METAPHRAM DAMPER REGULATORS

Metal Diaphrams—Last the life of the boiler

For Low Pressure Steam—Vacuum—Vapor or Hot Water. Smallest to the largest Boilers.

Write for catalog—if your jobber cannot supply

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO
The A Jacks People (A Jacks for High Pressure)

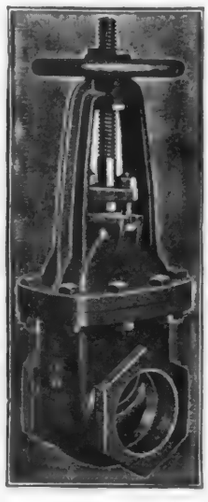
METAPHRAM

IRON BODY GATE VALVES

SCREWED, FLANGED
AND
HUB END STYLES

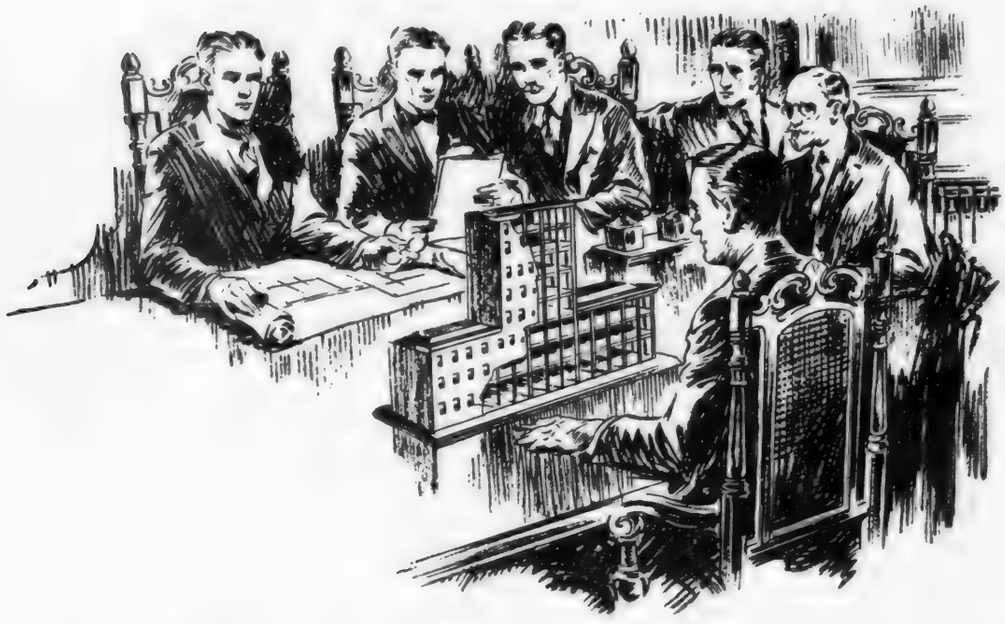
NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



Illinois Malleable Iron Company

1801 Diversey Parkway **Chicago, Ill.**



Plan with the Banker's viewpoint

COMMERCIAL UTILITY! . . . In those two words is found the formula by which modern structures are tested . . . In the majority of cases, before your pencil picture can become a reality, its commercial worth must be proved to the bankers!

Location is important. But no less vital are the mechanical details. Even one or two hard-to-heat apartments will seriously reduce the rental return. Overheating will have a like effect—and increase operating costs . . . Webster Systems of Steam Heating are being specified widely by architects who seek:

First, to assure comfort to every tenant, thus reducing turnover.

Second, to provide flexible heating control, permitting each tenant to have the desired amount of heat, *without* overheating and fuel waste.

Third, maximum resale value. Experience of many successful operators shows that the slight added cost of Webster Systems is worth hundreds of dollars in resale value.

Let the nearest Webster office help you obtain the maximum value from your next project.

Approved by Successful Investors

Installed by Successful Heating Contractors

Many leading investors and mortgage-bond houses have put their seal of approval on Webster Systems of Steam Heating. Heating Contractors who concentrate on 'Webster' installation work are prominent in almost every growing center of population.

There is potential profit in knowing more about Webster Systems. Ask us.

Warren Webster & Company

Pioneers of the Vacuum System of Steam Heating

Camden, N. J. **50 Branch Offices**

In Canada, Darling Bros., Ltd., Montreal

– since 1888

Webster Systems of Steam Heating

More than 37,000 installations in America's finer buildings

Finding the needle

Calling the Roll of Trane Bellows Trap Users

Watkins Development Central Heating
Pittsburgh, Pa., 2500

New Parliament Buildings
Toronto, Canada, 1125

American Bond & Mortgage Co.
New York, N. Y., 684

General Stark Hotel
Canton, Ohio, 534

Willetts Apartments
New York, N. Y., 530

Merchant's National Bank
Cedar Rapids, Iowa, 528

Baker Office Building
Minneapolis, Minn., 527

English Apartments
Los Angeles, Calif., 430

Wright & Kremers Apartments*
Niagara Falls, N.Y., 419

Reynold's 14-Story Office Building
Jackson, Mich., 394

*Due to a typographical error, this job was listed in an earlier advertisement as being located in Bronxville, N.Y., instead of Niagara Falls, N. Y.

(to be continued)

This signal trap, with its genuine Trane everlasting bellows, its brass body, its wide operating range between 15 inches to 25 pounds pressure, its balanced pressure, and its five-year guarantee, is but one of the "Big Three" items in Trane's Undivided Responsibility Line. The other two items are Trane's Bellows Packless Supply Valves, and the Two Motor Trane Return Line Special Vacuum Pump.

A LOT of people believe that it's as easy to find a needle in the proverbial haystack as it is to find a defective radiator trap on a big job. Maybe so. It depends on the trap.

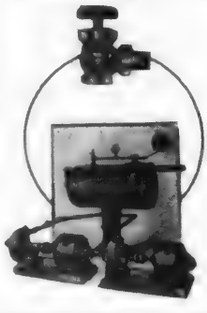
A defective **Trane** trap on a big job wouldn't be hard to find—it would be hard to overlook. Trane traps are Signal traps. The Signal isn't a noise. Rather, it is a matter of relative radiator temperatures. But it is definite; it's positive—there is no question about it.

This signal feature was incorporated into the design of Trane traps to help correct a condition in industry. The condition exists particularly in larger installations where periodic inspections are made of all radiator traps to be sure thermostatic members are in perfect condition.

Such inspections are expensive. And they are entirely unnecessary with Trane SIGNAL traps. Users know their Trane traps are right—they would signal if they weren't.

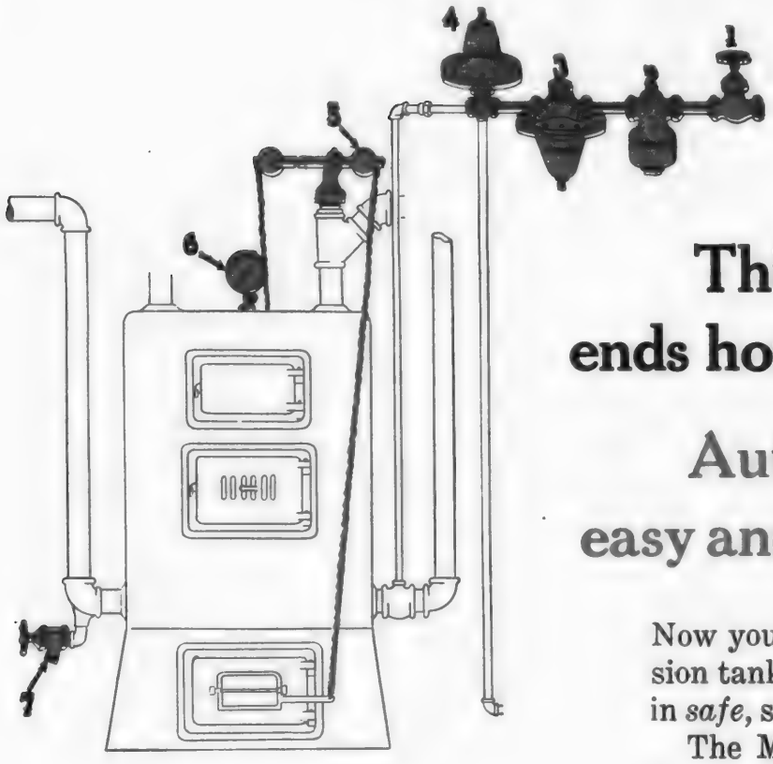
Investigate this "line of the least resistance." Your time will be well spent.

The other two of Trane's Big Three



HEATING TRANE PRODUCTS PUMPING

THE TRANE COMPANY, 206 Cameron Ave., La Crosse, Wis., Manufacturers of vapor and vacuum heating specialties and pumps. Branches and sales connections at New York, Chicago, Boston, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany, Minneapolis, Salt Lake City, Ft. Wayne, Portland, Ore., Greensboro, N. C., Zanesville, Ohio, Tampa, Fla., Baltimore, Md., Des Moines, Iowa, New Orleans, La., New Haven, Conn. In England: 22-23 Clerkenwell Close, London, E.C.1. In Canada: The Trane Co., 28 River St., Toronto, 2; Thomas Robertson & Co., 134 Craig St., West, Montreal; F. S. Murdoch, 310 Breadalbane, Winnipeg. In Japan: The Uchida Trading Co., Ltd., Tokio—Osaka—Kobe. In China: C. J. Doughty & Co., 7 Jinkee Road, Shanghai.



This *safety* system ends hot water heat troubles

Automatic—Simple easy and *profitable* to install

Now you can ban the troublesome expansion tank—and still know you are putting in *safe*, sure-acting hot water heat control.

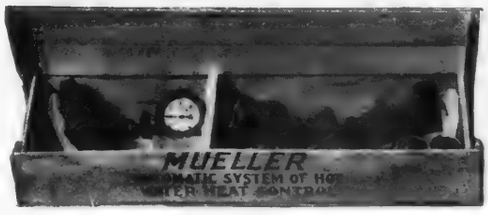
The Mueller Hot Water Heat Control System—entirely automatic, simple, safe and dependable—gives perfect, positive control for hot water heating.

You can install this system in two hours—and your customer will be your friend for life.

The Mueller system costs no more than the obsolete expansion tank system. It eliminates all the objectionable features of the expansion tank—evaporation, overflowing, "waterlogged" tanks, etc. It permits accurate regulation of temperature. Saves coal through automatic damper control.

You couldn't give your customer a better job! Yet you can cut your labor costs drastically by using this system.

Sales of Mueller Systems practically doubled during the past year. Get your share of this profitable business. Write for special Mueller booklet giving details. A nearby Mueller jobber will give you prompt deliveries.



Easiest to install

This system comes fully assembled, packed in a box, handy for taking right on the job. Every installation means a satisfied customer.

MUELLER CO.

(*Established 1857*)

Factories: Decatur, Illinois; Port Huron, Michigan.

Canadian Factory
MUELLER, Limited, Sarnia.

Branches
New York, San Francisco, Los Angeles

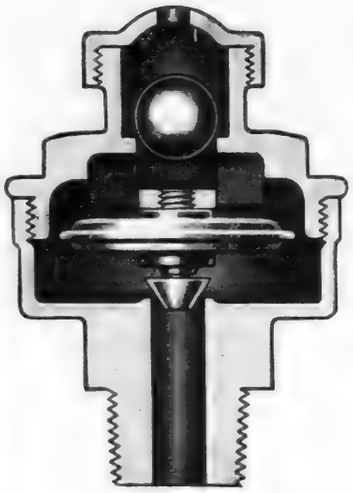
MUELLER

Automatic Hot Water Heat Control

McALEAR

AUTOMATIC AIR VALVES

FOR USE IN CONNECTION WITH LOW PRESSURE, VAPOR OR STEAM HEATING SYSTEMS



No. 14 Valve

GET RID OF THE AIR

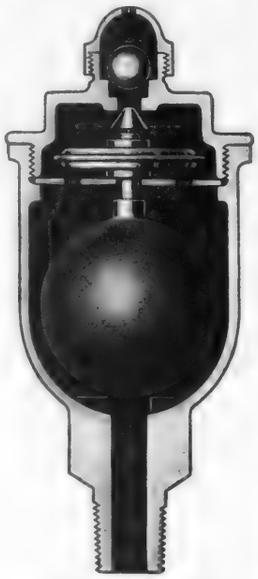
and you have eliminated 90% of your trouble. You can cure sick jobs with these valves—try it.

No. 14 Double Duty Valve—for venting mains, risers, coils, etc. Will close tight against steam and prevent air from re-entering. Sizes—⅜"-½"-¾".

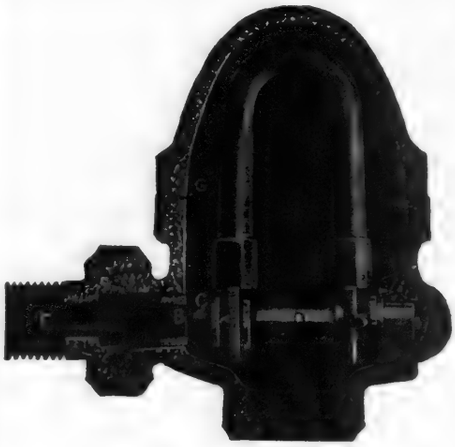
No. 15 Triple Duty Valve—for venting mains, etc. Will close tight against steam and water and prevents return of air. Sizes—½"-¾"-1".

Write for General Catalog No. 28

McALEAR MFG. CO.
1901-7 So. Western Ave.
CHICAGO



No. 15 Valve



The Perfect Automatic Valve for Vacuum or Vapor Heating

The "Vento" Automatic Valve represents a steady improvement in the Haines line of steam traps and offers the highest degree of steam trap efficiency.

There has been no change in the old reliable principle that has placed Haines Automatic Valve in a class by itself. The operating power is identical—the only difference being in the general construction.

Special features are: Horizontal mounting of valve mechanism—long range of movement—positive action—quick opening and closing.

"VENTO" Advantages

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

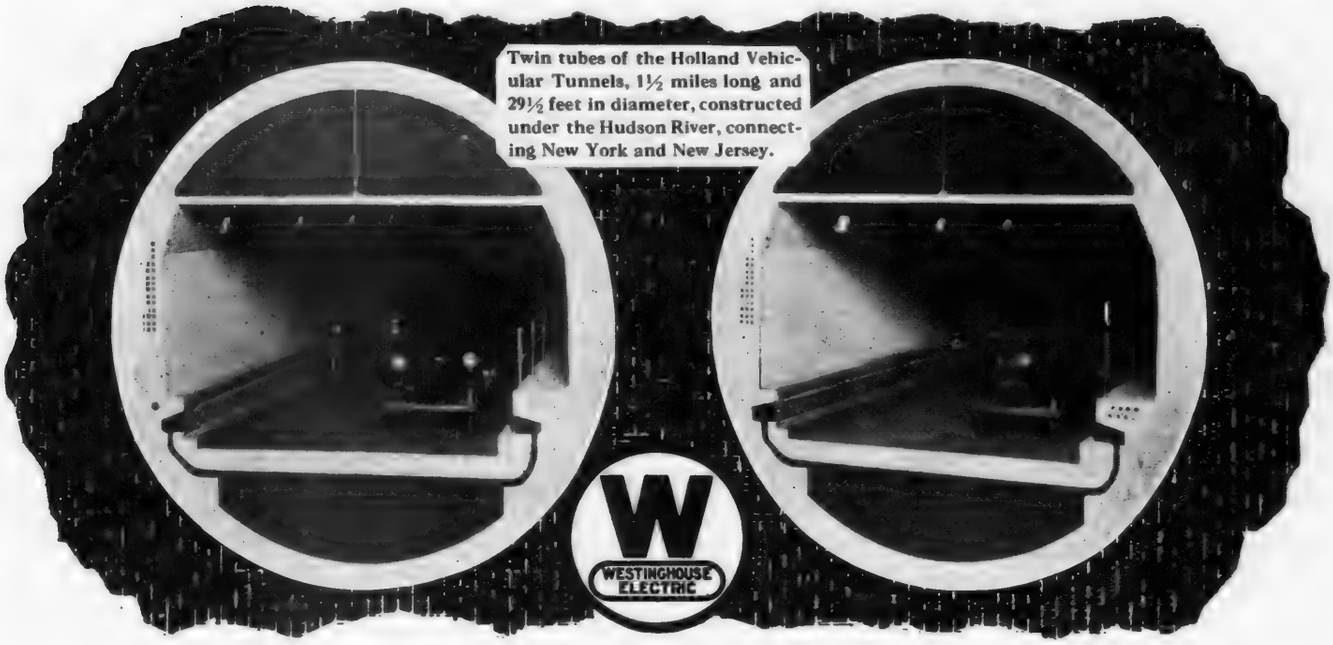
Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

Send for booklet

WILLIAM S. HAINES & CO.
12th & Buttonwood Streets
PHILADELPHIA, - - PA.

VENTO



Twin tubes of the Holland Vehicular Tunnels, 1½ miles long and 29½ feet in diameter, constructed under the Hudson River, connecting New York and New Jersey.

—in the Holland Tunnels

84 Motors—6260 Horsepower

IN a ventilating problem that had no precedent—a problem that required the most careful consideration of the electrical equipment to be used—it is significant that Westinghouse motors were selected to drive the huge ventilating fans.

84 Westinghouse type CW wound rotor motors, totaling 6260 horsepower, are being installed.

Two-thirds of the 84 motor-driven ventilating fans will change the air in the tunnel with sufficient rapidity to keep the air pure under normal conditions. The remainder are to be held in reserve for emergencies.

The first Westinghouse installation in these tunnels consisted of ten 600-hp. motors which were used to drive the compressors during tunneling operations, and 20 Baldwin-Westinghouse locomotives for haulage.

Just one more example of the ability of the Westinghouse organization to equip electrically any construction or ventilating project however exacting the requirements or difficult the problem.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse

X87217

New Hospital in Pennsylvania

equipped with

Mouat System of Heating

The heating of a hospital naturally demands utmost care in the selection of the heating equipment.

The health and comfort of the patients at the Homestead Hospital, at Homestead, Pa., have been entrusted to the efficient performance of the Mouat System of Heating. Mouat Heating is being used in many institutions throughout the country and has established a wide reputation for efficiency as well as economy in operation.

Let us send full information.

MOUAT VAPOR HEATING COMPANY

CLEVELAND, OHIO

A two-pipe gravity vapor or atmospheric steam heating system, operating at from 1 to 2 ounces pressure.

VAPOR MOUAT HEAT

Homestead Hospital,
Homestead, Pennsylvania
Press C. Dowler, Architect
Pittsburgh, Pa.
Pittsburgh Heating Co.
Heating Contractors.

No. 1 Pressure Regulator—Piston Type
Made in sizes ⅜ to 14 in. inclusive—Std. and Ex. Hvy.
Sizes 1½ in. and under made with bronze bodies—screwed ends only.
Sizes 2 to 6 in. inclusive made with iron bodies—screwed or flanged ends.
Sizes 7 in. and above made with iron bodies—flanged ends only.

KLIPFEL

PRESSURE REGULATORS

Automatically reduce any initial steam, air or water pressure to any desired reduced pressure above 2 lbs.

Maintain reduced pressure constantly regardless of fluctuations in boiler pressure, or changes in the demand for steam.

Simple, rugged and direct acting. As low pressure builds-up and exerts pressure under piston, a balance is formed between low pressure and weighting, which in turn regulates the inner valve opening.

Visible in action. Lever may be used to open, close or test by hand. Position of inner valve may be easily judged by looking at the lever.

Bronze cylinder, multiple grooved piston and balanced plunger type bronze inner valve. All working parts removable while valve body remains in the pipe line.

No troublesome springs, toggles, packing boxes or pilot valves. Dashpot included, which insures steady service pressure and overcomes any tendency of valve to chatter or vibrate.

Guaranteed to closely regulate at maximum steam loads, as the capacity—size for size—is equal to or greater than that of any competing pressure regulator.

We Invite Correspondence.

KLIPFEL MFG. CO., 2641-59 W. Harrison St. CHICAGO, ILL.

Manufacturers of a Complete Line of Steam Specialties including Expanded Outlet Pressure Regulators (Both Piston and Diaphragm Types)--Float Valves—Pump Governors—Back Pressure Valves—Relief Valves—Grease Traps—Steam Traps and many other Specialties.
Sold by Leading Jobbers in all Principal Cities—Write for Catalog No. 20.

West High School, Denver, Colo., Univent Equipped. W. H. Edwards, Denver, Colo., *Architect*
McCarty-Johnson, Plumbing & Heating Co., Denver, Colo., *Contractors*

On Your Recommendations their Health depends

Human comfort, health and progress often depend upon your judgment.

Like the Architects, your profession requires you to make decisions of tremendous consequences to others.

Your recommendations for ventilating equipment in schools, office buildings, telephone exchanges, or other buildings where many human beings must assemble, work and breathe—have consequences reaching far into the future.

It is therefore important to know about the Univent. It is the complete individual ventilating machine, which draws fresh air directly from outdoors, cleans it, warms it to a comfortable temperature, and diffuses it to all parts of the room, providing at the same time an agreeable air motion —without drafts.

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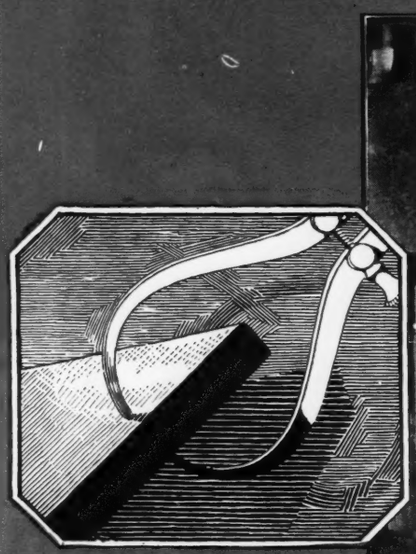
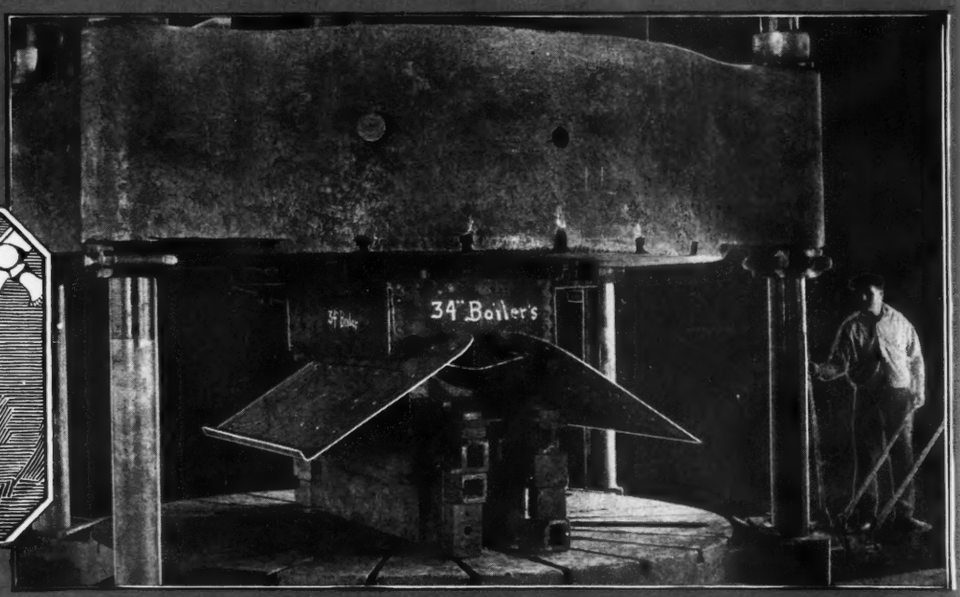


Thicker plates than ordinarily are used.



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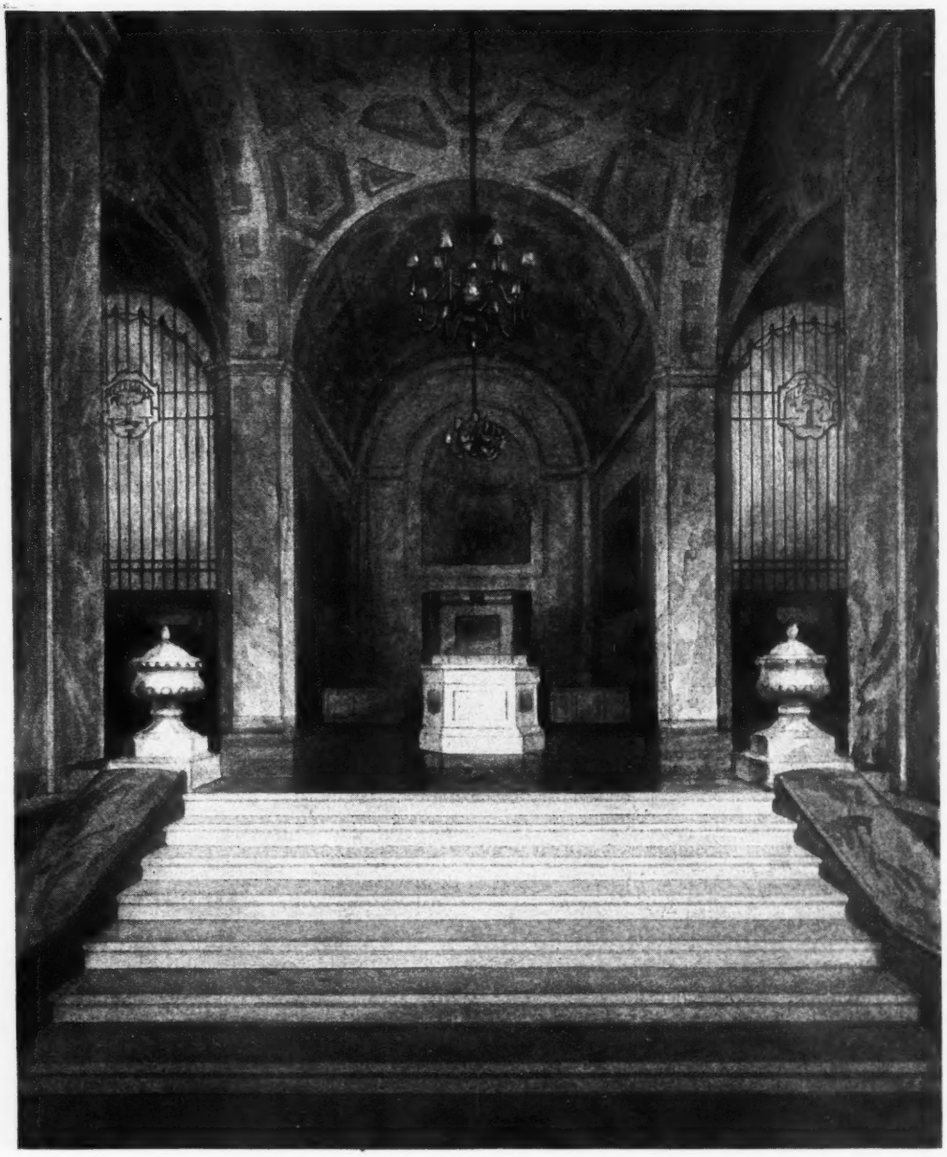

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